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DIVISION OF WATER POLLUTION CONTROL
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1981 VOLUNTEER LAKE

MONITORING PROGRAM REPORT

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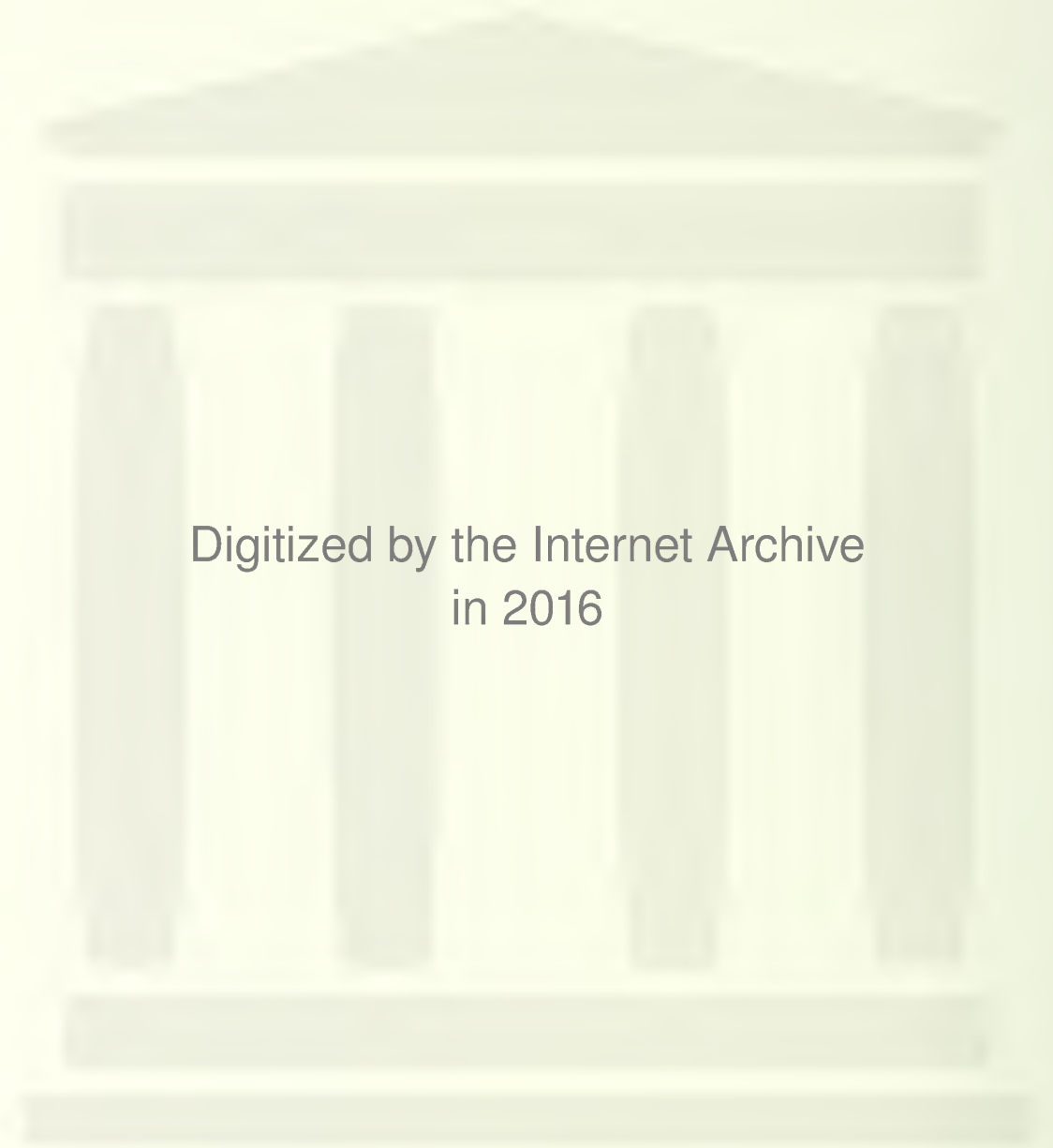

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

LAKE PETERSBURG, MENARD COUNTY, ILLINOIS

A Cooperative Citizen-
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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ACKNOWLEDGEMENTS

This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

Illinois EPA's Ambient Monitoring Unit, Planning Section, Division of Water Pollution Control, under the direction of Kenneth R. Rogers, was responsible for the design and implementation of the program, as well as preparation of this report. Substantial assistance was provided by the Agency's Public Participation Section supervised by Gloria Craven.

Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

Volunteers were trained by Public Participation Coordinators Carol Beim, Bob Hagele, William Hammel, Patrick McCarthy, Vanessa Musgrave, and Dawn Wrobel. Lake maps were prepared by J. W. Hammel and Bob Hagele. Lake assessment summaries were prepared by Patrick McCarthy.

Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

Donna Sefton, Howard Essig, John Little, John Lesnak, Carol Beim, and Bob Hagele wrote portions of the lake reports. Reports were edited by Planning Section and Public Participation staff, particularly Marilyn Budd and Mary Anderson. The contributions of Robert Clarke and Thomas Davenport are recognized.

Reports were typed by Word Processing under the direction of Norma Kraus and Diane Woodyard while Field Observations and Lake Assessment Summaries were typed by Betty Pennington, Lori Whalen, Karen Janssen, and Marilyn Budd.

INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled, "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Petersburg is a 191 acre impoundment owned by the Lake Petersburg Association. It is located two miles south of Petersburg in Menard County, Illinois. The lake was constructed by the damming of an unnamed stream in 1963; it filled in 1967. It has a maximum depth of 65 feet, an average depth of 24 feet, and a storage capacity of 4,584 acre-feet (Table 1).

Lake Petersburg serves as a recreational lake, with heavy usage for power boating and waterskiing, and moderate usage for fishing and swimming. Access is limited to property owners and their guests who must hold "guest" fishing licenses if they plan to fish.

The 1,400 acre watershed of Lake Petersburg is comprised primarily of a golf course and residential areas. The lake shoreline is primarily residential.

Algal blooms and aquatic weeds are considered severe problems in the shallow areas of Lake Petersburg and moderate problems throughout the lake. Runoff from lawns/golf courses; feedlot, cropland, pasture, construction site, and forestry runoff; waterfowl; and sediment in the lake are cited as potential pollution sources.

TABLE 1. LAKE ASSESSMENT SUMMARY, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS (RE-B06-L).

I. GENERAL INFORMATION

River Basin: Sangamon
Segment: B06

Ownership: Lake Petersburg Assoc.

Surface Area (Acres): 191
Watershed Area (Acres): 1400
Maximum Depth (Feet): 65
Average Depth (Feet): 24
Storage Capacity (Acre/Feet): 4584
Inflowing Stream(s): none named
Outflowing Stream(s): none named
Water Retention Time: 4,367 years
Lake Type: dammed stream
Year Constructed: dam - 1963
lake filled - 1967

II. USAGE

Public Access: no - only as "guest" of owners
Lake Usage:
Potable Water Supply: none
Industrial Water Supply: none
Agricultural Water Supply: light
Cooling Water: none
Recreation:
Fishing: moderate
Swimming: moderate
Power Boating: heavy
Row Boating or Canoeing: light
Sailboating:
Camping: none
Picnicking: light
Waterfowl Hunting: none
Waterfowl Observation:
Other: waterskiing - heavy

Recreational Facilities:
scuba diving area, fishing

Shoreline Usage (Percent):
Urban (Including Streets): 1%
Residential (Including Lawns): 54%
Golf Courses: 10%
Pasture or Grassland: 10%
Woodland: 15%
Row Crops: 5%
Wetland: 5%
Other:

Watershed Usage (Percent):
Urban: 1%
Residential: 28%
Golf Courses: 25%
Pasture or Grassland: 5%
Woodland: 10%
Row Crops: 30%
Wetland: 1%
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: good
Fishing: good
Conditions and Extent:
Suspended Sediment: slight
Deposition of Sediment: slight
Algal Blooms: moderate to severe
Aquatic Weeds: moderate to severe
Taste and/or Odor: minimal
Water Level Fluctuation: slight
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage:
Septic Tanks: yes
Pasture or Grassland Runoff: yes
Cropland Runoff: yes
Feedlot Runoff: yes
Construction Site Runoff: yes
Fertilizer or Pesticides from Lawns/Golf Courses: yes
Orchards:
Forestry Operations Runoff: yes
Mining:
Waterfowl: yes
Sediment in Lake: yes
Other:

V. LAKE MANAGEMENT

Comments: Chemically treated 2 or 3 times in summer and fall.

Information Supplied By Robert W. Eisenhart (1981)

Assessment and monitoring information for Lake Petersburg was provided by Robert W. Eisenhart, a lake resident. Secchi disc transparency, total depth and field observations were recorded at five sites (located in Fig. 1) on twelve dates in 1981: May 6 and 23, June 15 and 20, July 3 and 20, August 3 and 31, September 12 and 21 and October 5 and 26.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report, "Volunteer Lake Monitoring, 1981", Section IV, "Understanding Illinois Lakes."

The Secchi monitoring data for Lake Petersburg are summarized in Table 2 and plotted in Fig. 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Petersburg

The average Secchi disc transparency of Lake Petersburg was 66.3 inches, which ranked number 13 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was greater than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was above average for Illinois lakes.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Lake Petersburg ranged from a maximum of 120 inches at Site 1 on June 15 to a minimum of 24 inches at Site 5 on September 12. Secchi readings were greater than four feet minimum recommended for swimming on all sampling dates at Site 2, on all dates except September 12 at Sites 1 and 3, and on all dates except September 12 and 21 and October 5 at Sites 4 and 5.

As is typical of Illinois reservoirs, a spatial trend of increasing transparency from the lake headwaters to the dam was apparent in Lake Petersburg. The average transparencies at Sites 5, 4, 3, 2, and 1 (headwaters to dam) were 51.0 inches, 60.5 inches, 67.5 inches, 71.5 inches and 77.8 inches, respectively. Field observations indicate that the lower transparencies at Site 5 were primarily due to the higher levels of algae found there.

FIGURE 1

LAKE PETERSBURG

MENARD COUNTY

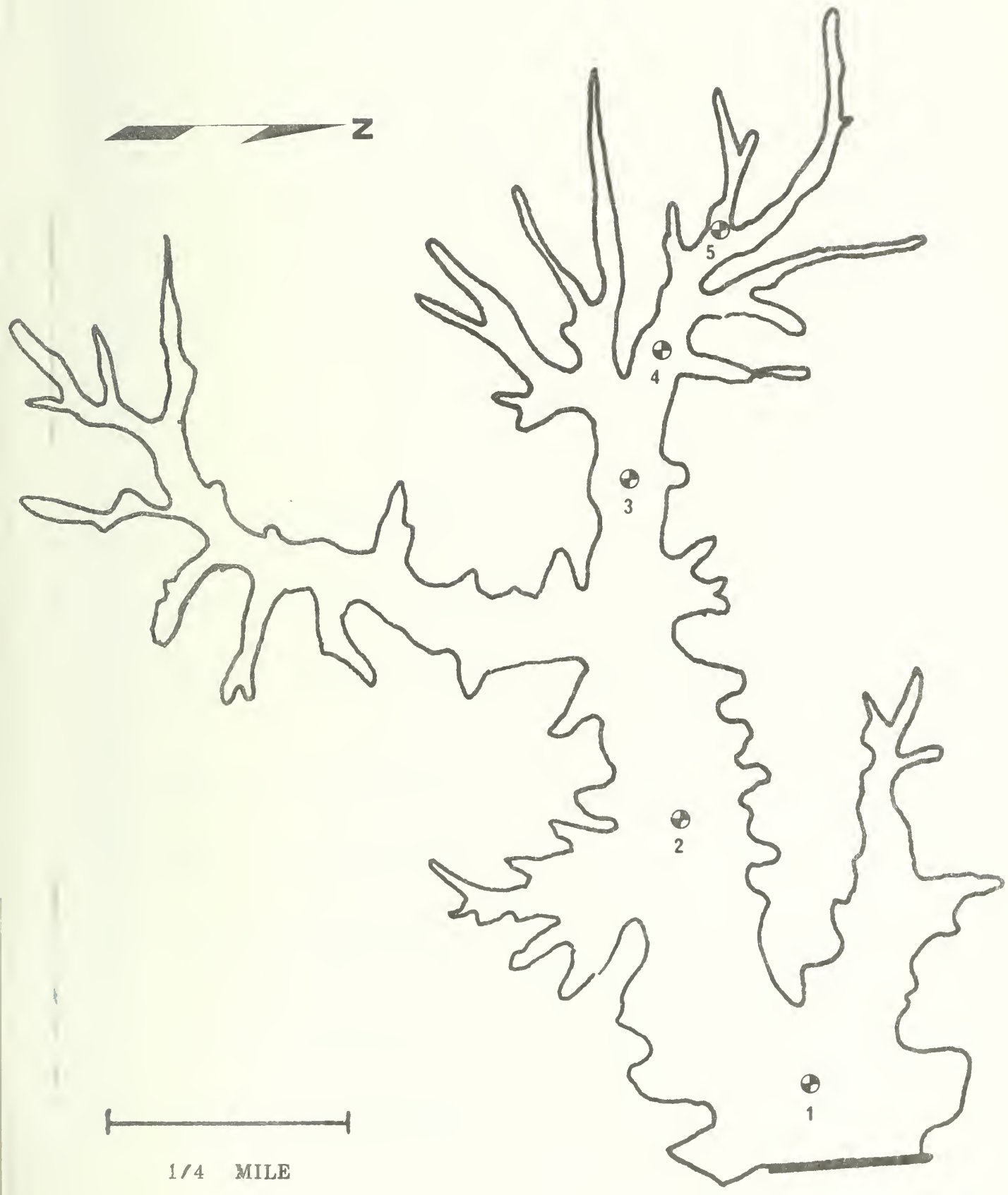

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) PETERSBURG/MENARD COUNTY, ILLINOIS (VOLUNTEER DATA 1991)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	MEAN	STD DEV
05/ 6	99.0	66.0	51.0	51.0	-1.0	66.0	22.6
05/ 23	84.0	72.0	57.0	60.0	48.0	64.2	14.0
06/ 15	120.0	96.0	108.0	96.0	78.0	99.6	15.6
06/ 20	84.0	84.0	84.0	78.0	54.0	76.8	13.0
07/ 3	102.0	90.0	84.0	66.0	66.0	81.6	15.6
07/ 20	84.0	72.0	66.0	66.0	48.0	67.2	13.0
08/ 3	60.0	60.0	60.0	60.0	66.0	61.2	2.7
08/ 31	60.0	72.0	72.0	66.0	48.0	83.6	10.0
09/ 12	42.0	54.0	36.0	36.0	24.0	38.4	10.0
09/ 21	48.0	48.0	48.0	42.0	48.0	46.8	2.7
10/ 5	54.0	48.0	48.0	45.0	30.0	45.0	9.0
10/ 26	96.0	96.0	96.0	78.0	72.0	87.6	11.7

SUMMARY STATISTICS

	SITES			LAKE		
MEAN	77.8	71.5	67.5	62.0	52.9	66.6
STD DEV	24.6	17.2	21.8	17.1	16.7	20.0
MIN	42.0	48.0	36.0	36.0	24.0	24.0
MAX	120.0	96.0	108.0	96.0	78.0	120.0
AV DEPTH	57.4	40.0	33.0	25.1	9.6	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) PETERSBURG/MENARD COUNTY, ILLINOIS (VOLUNTEER DATA 1991)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	MEAN	STD DEV
05/ 6	60.5	50.5	33.0	16.5	-1.0	42.1	22.4
05/ 23	51.0	45.0	32.5	24.0	9.5	32.4	16.6
06/ 15	56.0	50.0	33.0	25.0	9.0	34.6	19.0
06/ 20	55.5	49.0	34.5	26.0	9.5	34.9	18.4
07/ 3	52.5	46.5	33.0	26.5	9.5	33.4	16.8
07/ 20	54.0	47.5	34.0	26.5	9.5	34.3	17.0
08/ 3	50.0	48.5	36.0	27.0	10.0	34.3	16.5
08/ 31	56.0	54.0	34.0	26.5	9.5	36.0	19.5
09/ 12	61.0	49.5	34.5	26.0	10.0	36.2	19.9
09/ 21	64.0	38.5	29.0	24.5	9.5	33.1	20.2
10/ 5	63.0	57.0	37.5	26.5	10.0	38.0	21.0
10/ 26	57.0	53.0	28.5	26.5	9.5	34.3	20.1

SUMMARY STATISTICS

	SITES			LAKE		
MEAN	57.4	49.0	33.0	25.1	9.6	35.3
STD DEV	5.6	4.8	3.1	2.9	0.3	17.4
MIN	50.0	38.5	28.5	16.5	9.0	9.0
MAX	68.5	57.0	37.5	27.0	10.0	68.5
AV DEPTH	57.4	49.0	33.0	25.1	9.6	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) PETERSBURG/MENARD COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

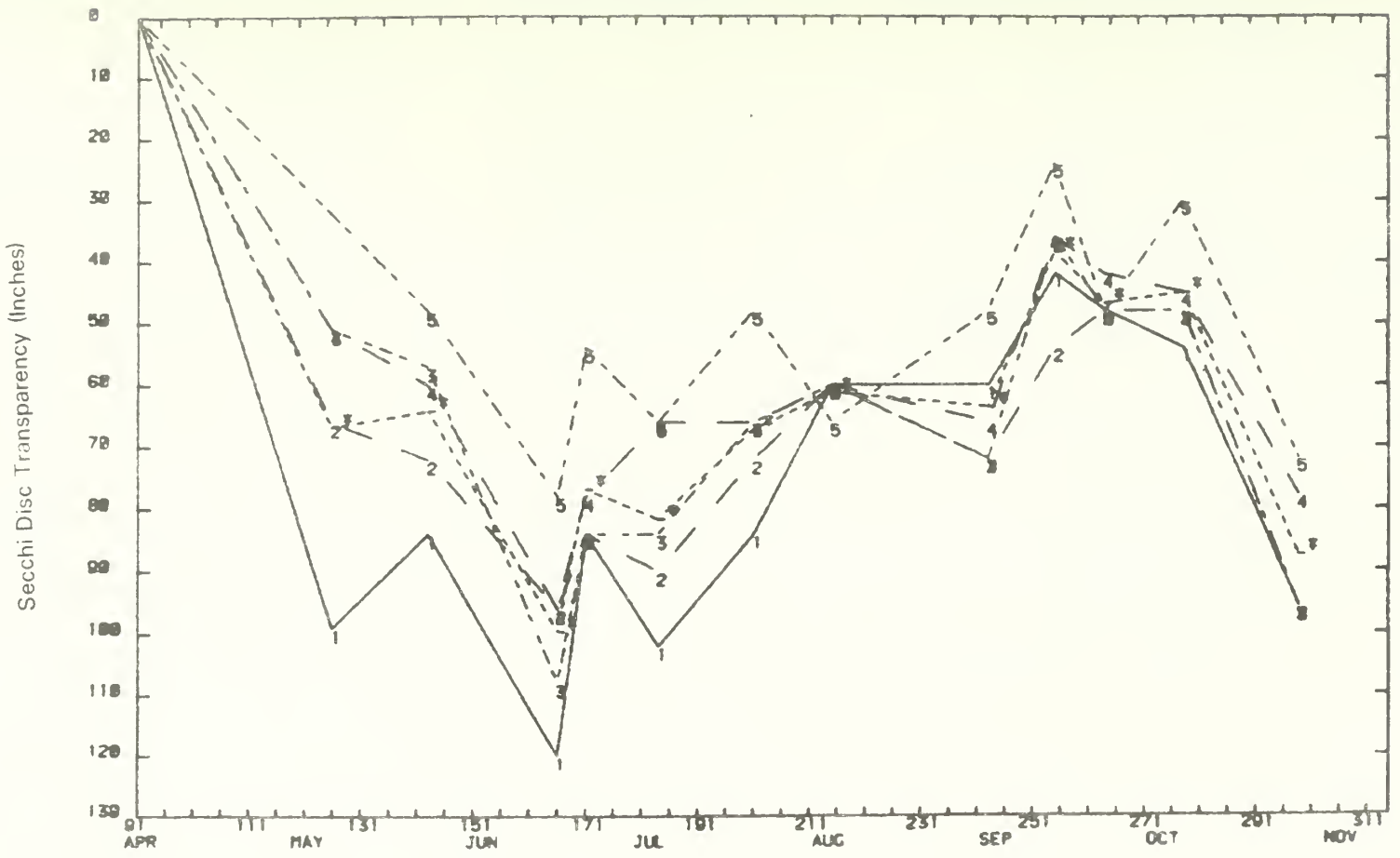

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/6/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	many clouds
PRECIPITATION:	no rain	v. lt. rain
WAVES:	moderate	moderate
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:	NE	NE
OBSERVATIONS MADE BY:	Bob Eisenhart	

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 6"
RECREATIONAL USAGE: none

LAKE MANAGEMENT: None in 1981

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/23/81	WATER COLOR:	clear lt. green	clear lt. green	lt. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	* algal col.	waterfowl	waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	few clouds
PRECIPITATION:	no rain	v. lt. rain
WAVES:	ripple-small	ripple-small
AIR TEMPERATURE:	warm	cool-warm
WIND DIRECTION:	SW	SW
OBSERVATIONS MADE BY:	Bob Eisenhart	

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 8"
RECREATIONAL USAGE: fishing, swimming, power boating, waterskiing, row boating/ canoeing, sailing, picnicking, sunbathing
LAKE MANAGEMENT: none (due to start 5/24/81)
ADDITIONAL COMMENTS: early control of weeds & algae

*detritus, waterfowl

DATE	OBSERVATION	SITE 4	SITE 5
5/23/81	WATER COLOR:	lt. green	lt. green
	SEDIMENT:	minimal	minimal
	ALGAE:	minimal	slight
	WEEDS AT SAMPLE SITE:	minimal	slight
	WEEDS NEAR SHORE:	slight	moderate
	OTHER SUBSTANCES:	* algal mats	* "clippings" algal mats algal col.
	ODOR:	no odor	

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:		
PRECIPITATION:		
WAVES:		
AIR TEMPERATURE:		
WIND DIRECTION:		
OBSERVATIONS MADE BY:		

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE:

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/15/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	minimal	minimal
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	many clouds
PRECIPITATION:	no rain	no rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	hot	very hot
WIND DIRECTION:	SE	SW
OBSERVATIONS MADE BY:	Bob Eisenhart	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing

LAKE MANAGEMENT: 5/25-29, 1981
Aquathol K/Diquat mixture to entire lake

ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/15/81	WATER COLOR:	lt. green	lt. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	minimal		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	slight	slight		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	minimal		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	minimal	minimal		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	*	*					
		waterfowl	waterfowl		OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

*algal mats & algal col.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/20/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, pontoon
	ALGAE:	minimal	minimal	minimal	WAVES:	calm-ripple	calm-ripple	boat
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	warm	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SW	S	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl *				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS: Shallow fingers are continually covered with algae.

*algal col. & duckweed

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/20/81	WATER COLOR;	lt. green	mod. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	slight		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	slight		WAVES:			
	WEEDS AT SAMPLE SITE:	slight	moderate		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	slight	moderate		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	algal mats	algal mats					
		* waterfowl	* waterfowl		OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

*algal col. & duckweed

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/3/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	hazy	hazy	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimming,
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	ripple	power boating, waterskiing, row boating/
	WEEDS AT SAMPLE SITE:	minimal	minimal	slight	AIR TEMPERATURE:	hot	hot	canoeing, sailing, picnicking
	WEEDS NEAR SHORE:	minimal	minimal	slight	WIND DIRECTION:	SE	SW	LAKE MANAGEMENT: 6/30 & 7/1, 1981
	OTHER SUBSTANCES:	algal col.	algal col.	algal col *				Aquathol K & Diquat mixture over entire lake
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS: Submerged weeds are plentiful in shallow areas like site 5. I doubt that entire lake was treated.

*detritus, algal mats, waterfowl

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS

DATE	OBSERVATION	SITE 4	SITE 5
7/3/81	WATER COLOR:	lt. green	lt. green
	SEDIMENT:	minimal	minimal
	ALGAE:	minimal	minimal
	WEEDS AT SAMPLE SITE:	moderate	large
	WEEDS NEAR SHORE:	moderate	large
	OTHER SUBSTANCES:	*	*
	ODOR:	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:		
PRECIPITATION:		
WAVES:		
AIR TEMPERATURE:		
WIND DIRECTION:		

OBSERVATIONS MADE BY: Bob Eisenhart

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE:

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

*detritus, algal mats, waterfowl

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/20/81	WATER COLOR:	lt. green	lt. green	mod. green
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	slight
	WEEDS NEAR SHORE:	slight	slight	moderate
	OTHER SUBSTANCES:	detritus waterfowl	detritus waterfowl	detritus waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	many clouds
PRECIPITATION:	no rain	mod. rain
WAVES:	small	white caps
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	W	SW

OBSERVATIONS MADE BY: Bob Eisenhart

OTHER COMMENTS

WATER LEVEL OF LAKE: above normal 2"
RECREATIONAL USAGE: fishing, swimming power boating, waterskiing, rowboating/ canoeing, sailing
LAKE MANAGEMENT: 6/30 & 7/1 Aquathol K plus CUSO4 for areas of Southern Niad.
ADDITIONAL COMMENTS: Horned pondweed was treated earlier with Aquathol K. Submerged weeds all along shoreline of lake

DATE	OBSERVATION	SITE 4	SITE 5
7/20/81	WATER COLOR;	mod. green	very green
	SEDIMENT:	slight	slight
	ALGAE:	minimal	minimal
	WEEDS AT SAMPLE SITE:	slight	slight
	WEEDS NEAR SHORE:	moderate	large
	OTHER SUBSTANCES:	detritus waterfowl	detritus waterfowl
	ODOR:		

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:		
PRECIPITATION:		
WAVES:		
AIR TEMPERATURE:		
WIND DIRECTION:		

OBSERVATIONS MADE BY:

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE:

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/3/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	slight	slight	slight
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	moderate	moderate	moderate
	OTHER SUBSTANCES:	waterfowl	waterfowl *	waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	many clouds
PRECIPITATION:	no rain	heavy rain
WAVES:	calm	white caps
AIR TEMPERATURE:	hot	hot
WIND DIRECTION:	E	SW

OBSERVATIONS MADE BY: Bob Eisenhart

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal 15"
RECREATIONAL USAGE: fishing

LAKE MANAGEMENT: July 30, 1981 Same treatment
ADDITIONAL COMMENTS: Treatment does not appear to help reduce aquatic plants. Maybe lake would be worse without treament

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/3/81	WATER COLOR:	mod. green	mod. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	minimal		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	minimal		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	moderate		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	slight	large		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	duckweed waterfowl		OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/31/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	many clouds	WATER LEVEL OF LAKE: above normal 12"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	moderate	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	slight	slight	slight	WIND DIRECTION:	S	W	LAKE MANAGEMENT: 8/20/81 Konneen (CUSO4)
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl	OBSERVATIONS MADE BY:	Bob		alone in Inlets only - discharged below surfa
	ODOR:	no odor	no odor	no odor				ADDITIONAL COMMENTS: as a purple liquid

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/31/8	WATER COLOR:	mod. green	mod. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	slight		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	slight		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	minimal		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	slight	minimal		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl		OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS: School in session. Calm between rains.
	ODOR:	no odor	no odor					

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/12/81	WATER COLOR:	lt. green	lt. green	grnsh-brn	CLOUD COVER:	many clouds	clear	WATER LEVEL OF LAKE: above normal 6"
	SEDIMENT:	minimal	minimal	slight	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, power boating
	ALGAE:	minimal	minimal	slight	WAVES:	calm	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	moderate	moderate	moderate	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl	OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/12/81	WATER COLOR:	brnsh-grn	lt. brown		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	slight		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	slight		WAVES:			
	WEEDS AT SAMPLE SITE:	slight	slight		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	moderate	slight		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	*						
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor						

* duckweed, waterfowl, leaves

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
9/21/81	WATER COLOR:	clear	clear	lt. green	CLOUD COVER:	few clouds	clear	WATER LEVEL OF LAKE:	normal
	SEDIMENT:	minimal	minimal	slight	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE:	fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	calm		
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot		
	WEEDS NEAR SHORE:	moderate	slight	slight	WIND DIRECTION:	SW	SSW	LAKE MANAGEMENT:	none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl					
					OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS:	Possible lake turnover during last reading
	ODOR:	no odor	no odor	no odor					

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/21/81	WATER COLOR:	lt. green	mod. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	slight	slight.		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	minimal		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	minimal		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	moderate	slight		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl					
		leaves	leaves		OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
10/5/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	overcast	many clouds	WATER LEVEL OF LAKE:	normal
	SEDIMENT:	slight	slight	slight	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE:	fishing
	ALGAE:	slight	slight	slight	WAVES:	ripple	ripple		
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm		
	WEEDS NEAR SHORE:	slight	slight	slight	WIND DIRECTION:	SSE	SWS	LAKE MANAGEMENT:	none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl					
					OBSERVATIONS MADE BY:	Bob Eisenhart		ADDITIONAL COMMENTS:	
	ODOR:	no odor	no odor	no odor					

TABLE 4. FIELD OBSERVATIONS, LAKE PETERSBURG, MENARD COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/5/81	WATER COLOR;	lt. green	lt. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	slight	slight		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	slight	moderate		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	slight		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	slight	slight		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl					
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/26/81	WATER COLOR:	clear	clear	clear	CLOUD COVER:	overcast	overcast	WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	min.-slight	min.-slight	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE:
	ALGAE:	minimal	minimal	minimal	WAVES:	calm-ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	N.W.	S.W.	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl				
					OBSERVATIONS MADE BY: Bob Eisenhart			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 4	SITE 5		WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/26/81	WATER COLOR:	clear	lt. green		CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:	minimal	min.-slight		PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:	minimal	slight		WAVES:			
	WEEDS AT SAMPLE SITE:	minimal	minimal		AIR TEMPERATURE:			
	WEEDS NEAR SHORE:	minimal	minimal		WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:	waterfowl	waterfowl					
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor					

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR;				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

There were seasonal differences in the transparency of Lake Petersburg. Lowest transparencies were generally recorded in late summer and were probably the result of algal blooms. Lower transparencies in late September and early October were probably coincident with fall turnover mixing of the lake. Nutrient laden bottom waters were distributed throughout the lake during fall overturn. This sudden availability by nutrients promoted algae blooms which reduced water transparency. The brownish-green water color at that time indicated that the algae were probably diatoms. By the end of October, the lake again cleared dramatically as lower water temperatures inhibited algal growth and low runoff occurred.

Field observations indicate that the transparency of Lake Petersburg is influenced primarily by the presence of algae: green water color was observed and algal colonies were noted on several sampling dates. Aquatic weeds were noted as abundant in shallow areas such as Site 5 (average depth 9.6 feet) and may reflect the occurence of nutrient input in these areas. The lake is treated with Aquathol K, Diquat, and copper sulfate two to three times in summer and fall in order to control aquatic weeds and algae.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Lake Petersburg (estimated at twide the Secchi depth) ranged from 7.0-20.0 feet at Site 1, from 8.0-16.0 feet at Site 2, 6.0-18.0 feet at Site 3, 6.0-16.0 feet at Site 4 and 4.0-13.0 feet at Site 5. Since Lake Petersburg is deep enough to thermally statify and had a euphotic zone tat was generally less than the total depths, low dissolved oxygen values may be expected in the bottom waters.

In the absence of dissolved oxygen, substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Petersburg, a recreational lake in central Illinois, was sampled on twelve dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Robert Eisenhart recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Petersburg (66.3 inches) ranked 13th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was greater than the four feet minimum recommended for swimming by the Illinois Department of Public Health, and was above average for Illinois lakes.

Field observations indicate that the transparency Lake Petersburg influenced primarily by algae. Lowest transparencies were recorded in September and early October and were coincidental with fall turnover. A spatial trend of increasing transparency from the headwaters to the dam was found.

Lake Petersburg is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Lake Petersburg is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrients and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Information on lake water levels is important for determining lake management strategies. Installation of a simple, but accurate, water level measuring device and frequent recording of lake water levels is recommended.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some oither mens may also reduce sediment input. Nutrient contributions from septic tanks, fertilizations of lawns, and waterfowl should also be investigated and minimized.

In-lake management may also warrant consideration. Aeration-destratification to prevent dissolved oxygen depletion may help to promote a shift in algal populations to species other than the problem-causing blue-greens, reduce the need for copper sulfate, and improve fishing. Harvesting of aquatic weeds or use of screen in selected areas for weed control might also be considered.

Continued monitoring is recommended for Lake Petersburg. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

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DS:jab/sp2161c

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

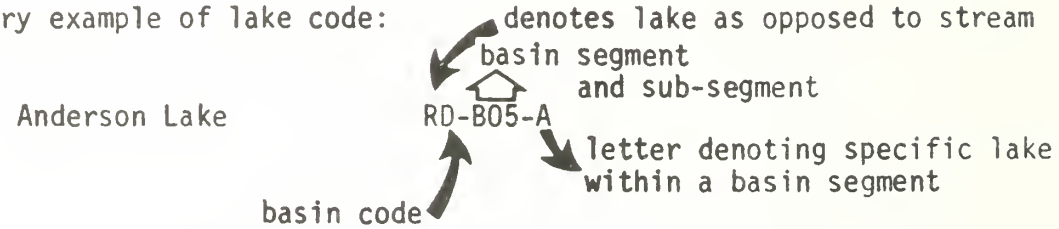
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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PARIS WEST LAKE, EDGAR COUNTY, ILLINOIS

A Cooperative Citizen -
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Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Paris West Lake, a 57 acre impoundment owned by the City of Paris, Edgar County, Illinois, was constructed by damming Sugar Creek in 1898. It has a maximum depth of 9 feet, an average depth of 3 feet and a storage capacity of 87 acre-feet (Table 1).

Paris West Lake serves as an industrial and cooling water supply. Recreational uses include fishing, swimming, power boating, waterskiing, rowboating and canoeing, sailboating, picnicking and waterfowl observation. Access is unlimited.

The 11,328 acre watershed of Paris West Lake is comprised of residential, pasture or grassland and row crop areas. Deposition of sediment and suspended sediment are considered substantial problems. Algal blooms, aquatic weeds, taste and odor and water level fluctuation in Paris West Lake are considered moderate problems. Septic tanks and pasture, grassland, cropland, and feedlot runoff are cited as potential pollution sources.

Assessment information on Paris West Lake was provided by Warren Brown and the Illinois State Water Survey (1966). Monitoring was performed by Warren Brown. Secchi disc depth, total depth and field observations were recorded at three sites (located in Fig. 1) on nine dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, PARIS WEST LAKE, EDGAR COUNTY, ILLINOIS (RB-A04-L).

I. GENERAL INFORMATION

River Basin: Wabash
Segment: A04

Ownership: City of Paris

Surface Area (Acres): 56.7
Watershed Area (Acres): 11,328*
Maximum Depth (Feet): 8.5
Average Depth (Feet): 3.3
Storage Capacity (Acre/Feet): 187.1
Inflowing Stream(s): Sugar Creek
Outflowing Stream(s):
Water Retention Time: 0.199 year
Lake Type: dammed stream
Year Constructed: 1898 - West Lake

II. USAGE

Public Access: yes
Lake Usage:
- Potable Water Supply:
- Industrial Water Supply: moderate
- Agricultural Water Supply: light
- Cooling Water: moderate
- Recreation: heavy
  - Fishing: heavy
  - Swimming: heavy
  - Power Boating: heavy
  - Row Boating or Canoeing: moderate
  - Sailboating: moderate
  - Camping: light
  - Picnicking: moderate
  - Waterfowl Hunting: none
  - Waterfowl Observation: moderate
  - Other: waterskiing - heavy

Recreational Facilities:
beach, picnic areas, campground, boat launch

Shoreline Usage (Percent): no data given
- Urban (Including Streets):
- Residential (Including Lawns):
- Golf Courses:
- Pasture or Grassland:
- Woodland:
- Row Crops:
- Wetland:
- Other:

Watershed Usage (Percent):
- Urban: X
- Residential:
- Golf Courses:
- Pasture or Grassland: X
- Woodland:
- Row Crops: X
- Wetland:
- Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: poor
Fishing: fair
Conditions and Extent:
- Suspended Sediment: large
- Deposition of Sediment: large
- Algal Blooms: moderate
- Aquatic Weeds: moderate
- Taste and/or Odor: moderate
- Water Level Fluctuation: moderate
- Fishkills: minimal
- Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
- Sewage Treatment Plant Effluent:
- Industrial Discharge:
- Urban Storm Drainage:
- Septic Tanks: yes
- Pasture or Grassland Runoff: yes
- Cropland Runoff: yes
- Feedlot Runoff: yes
- Construction Site Runoff:
- Fertilizer or Pesticides from Lawns/Golf Courses:
- Orchards:
- Forestry Operations Runoff:
- Mining:
- Waterfowl:
- Sediment in Lake:
- Other:

V. LAKE MANAGEMENT

Comments: Mudcat being used for dredging.

Information Supplied By Warren Brown (1981); *Illinois State Water Survey (1966).

FIGURE 1

PARIS WEST LAKE

EDGAR COUNTY

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Paris West Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Paris West Lake

The average Secchi disc transparency of Paris West Lake was 19.6 inches, which ranked number 64 when the average transparencies of volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was in the range generally associated with use impairment problems in Illinois lakes.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Paris West Lake ranged from a minimum of 10 inches at Site 5 on July 22 to a maximum of 36 inches at Site 3 on June 29 and August 12 and Site 5 on June 29. Secchi readings were below the four feet minimum recommended for swimming on all sampling dates.

A spatial trend of increasing transparency from the lake headwaters to the dam, as is typical of most Illinois reservoirs, was not found in Paris West Lake. Average transparencies at Sites 5 and 3 (headwaters to dam) were 19.7 inches, 18.7 inches and 20.4 inches, respectively. The lake was extremely turbid throughout the May-October sampling.

Field observations indicate that the lack of transparency at Site 5 was due primarily to suspended sediment, while at Site 3 it was primarily due to algae. The suspended sediment load tended to settle out in the upper end of the lake. However, as this sediment load settled out, algae appeared to become abundant so that the water did not become clearer towards the dam. This can be seen by the change in water color from brown at Site 5 to green at Site 3 and the routine treatment of the lake with copper sulfate for algal control.

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) PARIS WEST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	MEAN	STD DEV
05/ 13	-1.0	-1.0	14.0	16.0	20.0	16.7	3.1
05/ 28	-1.0	-1.0	14.0	14.0	15.0	14.3	0.6
06/ 15	-1.0	-1.0	24.0	20.0	18.0	20.7	3.1
06/ 29	-1.0	-1.0	36.0	26.0	36.0	32.7	5.8
07/ 22	-1.0	-1.0	12.0	12.0	10.0	11.3	1.2
08/ 12	-1.0	-1.0	36.0	24.0	24.0	28.0	6.9
09/ 8	-1.0	-1.0	18.0	18.0	18.0	18.0	0.0
09/ 23	-1.0	-1.0	12.0	20.0	18.0	16.7	4.2
10/ 28	-1.0	-1.0	18.0	18.0	18.0	18.0	0.0

SUMMARY STATISTICS

	SITES		LAKE		
MEAN	-1.0	-1.0	20.4	18.7	19.7	19.6
STD DEV	-1.0	-1.0	9.6	4.5	7.2	7.1
MIN	-1.0	-1.0	12.0	12.0	10.0	10.0
MAX	-1.0	-1.0	36.0	26.0	36.0	36.0
AV DEPTH	0.0	0.0	7.2	6.1	6.1	

-1 = missing value

See glossary for explanation of Summary Statistics

TABLE 3

DEPTH OF SITE (FEET) PARIS WEST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	MEAN	STD DEV
05/ 13	-1.0	-1.0	8.0	6.0	6.0	6.7	1.2
05/ 28	-1.0	-1.0	7.0	6.0	7.0	6.7	0.6
06/ 15	-1.0	-1.0	7.5	6.0	6.5	6.7	0.8
06/ 29	-1.0	-1.0	8.5	6.0	6.0	6.8	1.4
07/ 22	-1.0	-1.0	7.5	7.0	5.5	6.7	1.0
08/ 12	-1.0	-1.0	7.0	6.0	6.0	6.3	0.6
09/ 8	-1.0	-1.0	6.0	6.0	6.0	6.0	0.0
09/ 23	-1.0	-1.0	6.0	6.0	6.0	6.0	0.0
10/ 28	-1.0	-1.0	7.0	6.0	6.0	6.3	0.6

SUMMARY STATISTICS

	SITES		LAKE		
MEAN	-1.0	-1.0	7.2	6.1	6.1	6.5
STD DEV	-1.0	-1.0	0.8	0.3	0.4	0.7
MIN	-1.0	-1.0	6.0	6.0	5.5	5.5
MAX	-1.0	-1.0	8.5	7.0	7.0	8.5
AV DEPTH	0.0	0.0	7.2	6.1	6.1	

-1 = missing value

See glossary for explanation of Summary Statistics

FIGURE 2

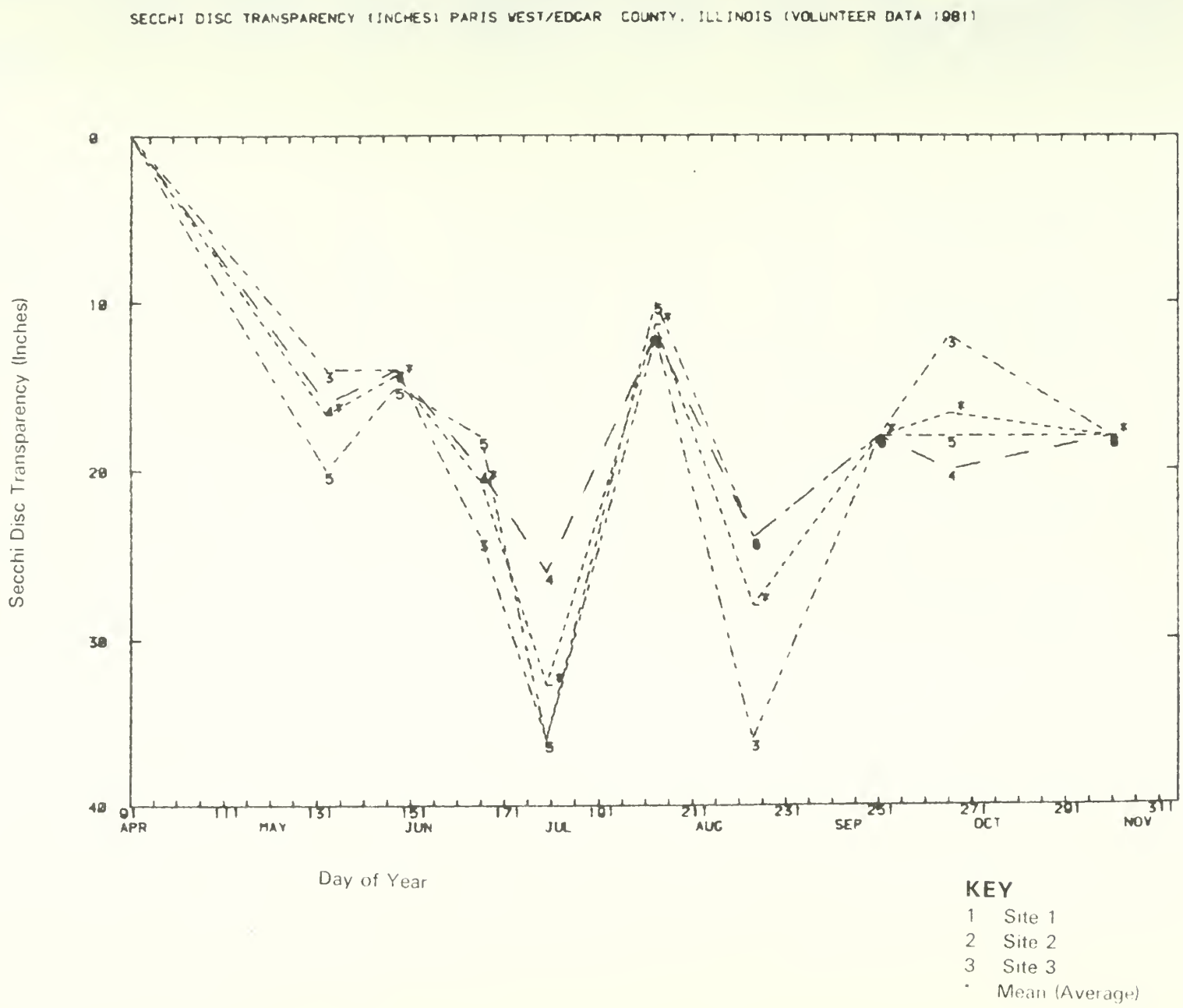
SECCHI DISC TRANSPARENCY (INCHES) PARIS WEST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)
Secchi Disc Transparency (Inches)
0
10
20
30
40
01 APR
11 MAY
21 MAY
31 MAY
10 JUN
20 JUN
30 JUN
10 JUL
20 JUL
30 JUL
09 AUG
19 AUG
29 AUG
08 SEP
18 SEP
28 SEP
08 OCT
18 OCT
28 OCT
07 NOV
17 NOV
27 NOV
Day of Year
KEY
1 Site 1
2 Site 2
3 Site 3
* Mean (Average)

TABLE [illegible] OBSERVATIONS, PARIS WEST LAKE, EDGAR COUNTY, ILLINOI

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
[illegible]	WATER COLOR	[illegible]	[illegible]	[illegible]	CLOUD COVER:	overcast	[illegible]	WATER LEVEL OF LAKE [illegible]
	SEDIMENT:	moderate	moderate	slight	PRECIPITATION:	no rain	v. lt. rain	RECREATIONAL USAGE [illegible]
	ALGAE	minimal	minimal	minimal	WAVES:	small	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	minimal	slight	WIND DIRECTION:	SE	NW	LAKE MANAGEMENT. [illegible]
	OTHER SUBSTANCES:	none	none	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
5/28/81	WATER COLOR:	very brown	very brown	very brown	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: above normal 3"
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	mod. rain	RECREATIONAL USAGE: none
	ALGAE:	slight	slight	slight	WAVES:	calm	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	minimal	minimal	slight	WIND DIRECTION:	NW	NW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl				
	ODOR:	fisny	fishy	fishy	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/15/81	WATER COLOR:	grn-brn	brnsh-grn	brnsh-grn	CLOUD COVER:	few clouds	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimming, rowboating /canoeing
	ALGAE:	minimal	minimal	minimal	WAVES:	moderate	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	very hot	
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	none	none				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
6/29/81	WATER COLOR:	mod. green	grn-brn	grnsn-brn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot	
	WEEDS NEAR SHORE:	minimal	slight	slight	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT: 6/29/81 copper sulfate the lake between 8 & 9 am.
	OTHER SUBSTANCES:	none	waterfowl	none				ADDITIONAL COMMENTS:
	ODOR:	fishy	fishy	fishy	OBSERVATIONS MADE BY:	Warren Brown		Treatment was for control of algae.

TABLE 4. FIELD OBSERVATIONS, PARIS WEST LAKE, EDGAR COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/22/81	WATER COLOR:	very green	grn-brn	lt.brown	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	slight	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: none
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	hot	
	WEEDS NEAR SHORE:	minimal	slight	slight	WIND DIRECTION:	NW	NW	LAKE MANAGEMENT: 7/22/81 1200 = copper sulfate from Penn. Central RR br. to dam.
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:
	ODOR:	fishy	no odor	no odor				Treatment was for algae control.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/12/81	WATER COLOR:		grnsh-brn	grnsh-brn	CLOUD COVER:	clear	hazy	WATER LEVEL OF LAKE: normal
	SEDIMENT:		slight	slight	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:		moderate	moderate	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:		minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:		moderate	moderate	WIND DIRECTION:	NW	NW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:		waterfowl	waterfowl	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:
	ODOR:		fishy	fishy				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/8/81	WATER COLOR:	brnsh-grn	brnsh-grn	brnsh-grn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: above normal 1"
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	vry.lt.rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	small	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	slight	moderate	moderate	WIND DIRECTION:	NW	SW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	waterfowl	waterfowl	duckweed	OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/23/81	WATER COLOR:	brnsh-grn	brnsh-grn	brnsh-grn	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	
	WEEDS NEAR SHORE:	slight	moderate	moderate	WIND DIRECTION:	E	NW	LAKE MANAGEMENT: none
	OTHER SUBSTANCES:	none	waterfowl	waterfowl	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

TABLE 4. FIELD OBSERVATIONS, PARIS WEST LAKE, EDGAR COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
5/28/81	WATER COLOR:	very brown	very brown	very brown	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	minimal	slight	slight	WIND DIRECTION:	N.W.	N.	LAKE MANAGEMENT: [illegible] CUS04 *
	OTHER SUBSTANCES:	waterfowl	algal mats	waterfowl				
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY: Warren Brown			ADDITIONAL COMMENTS: To control algae growth which wasn't as much as appeared

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
	ODOR:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
	ODOR:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 21 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPEPATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
	ODOR:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Paris West Lake (estimated at twice the Secchi depth) ranged from 2.0 - 6.0 feet at Site 3, from 2.0 - 4.3 feet at Site 4, and 1.7 - 6.0 feet at Site 5. Since Paris West Lake is so shallow (average depth 3.3 feet), bottom waters may remain oxygenated by mixing due to wind.

SUMMARY AND RECOMMENDATIONS

Summary

Paris West Lake, an impoundment in east central Illinois, was sampled on nine dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Warren Brown recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Paris West Lake (19.6 inches) ranked 64th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health and was in the range generally associated with use impairment problems in Illinois lakes.

Paris West Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks and fertilization of lawns should also be investigated and minimized.

Continued monitoring is recommended for Paris West Lake. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

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DS:jab/sp3873C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

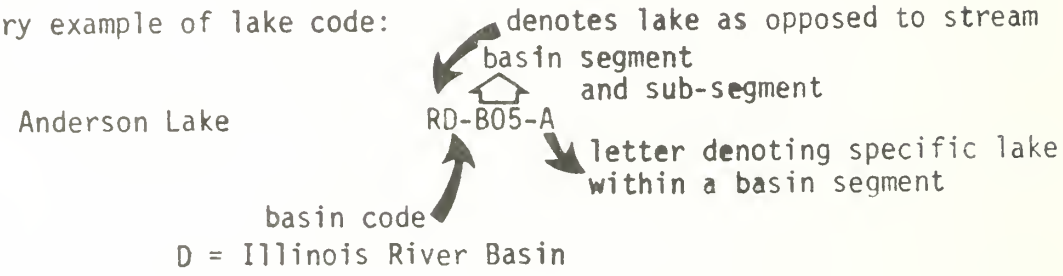
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

PARIS EAST LAKE, EDGAR COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Paris East Lake is a 163 acre impoundment owned by the City of Paris, Edgar County, Illinois. It was constructed by the damming of Sugar Creek. The western part was created in 1917; the eastern part was added in 1959-60. The lake has a maximum depth of 27 feet, an average depth of 10 feet and a storage capacity of 1,660 acre-feet (Table 1).

Paris East Lake serves as a potable, industrial and cooling water supply for the City. Recreational uses including fishing, swimming, power boating, rowboating or canoeing, sailboating, picnicking and waterfowl observation. Access is unlimited.

The 12,800 acre watershed of Paris East Lake is comprised of pasture or grassland, woodland and row crop areas.

Water level fluctuation on Paris East Lake is considered a substantial problem. Deposition of sediment, aquatic weeds and taste and odor are considered moderate problems.

Assessment information on Paris East Lake was provided by Warren Brown and the Illinois State Water Survey (1966). Secchi disc depth, total depth, and field observations were recorded by Warren Brown at three sites (located in Fig. 1) on nine dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, PARIS EAST TWIN LAKE, EDGAR COUNTY, ILLINOIS (RB-A04-L).

I. GENERAL INFORMATION

River Basin: Wabash
Segment: A04

Ownership: City of Paris

Surface Area (Acres): 162.8
Watershed Area (Acres): 12,800*
Maximum Depth (Feet): 26.5
Average Depth (Feet): 10.2
Storage Capacity (Acre/Feet): 1660
Inflowing Stream(s): Sugar Creek
Outflowing Stream(s): Sugar Creek
Water Retention Time: 1.557 years
Lake Type: dammed stream
Year Constructed: W. part - 1917
E. part - 1959 - 60

II. USAGE

Public Access: yes
Lake Usage:
Potable Water Supply: heavy
Industrial Water Supply: moderate
Agricultural Water Supply: light
Cooling Water: moderate
Recreation: heavy
Fishing: heavy
Swimming: heavy
Power Boating: heavy
Row Boating or Canoeing: moderate
Sailboating: light
Camping: none
Picnicking: moderate
Waterfowl Hunting: none
Waterfowl Observation: moderate
Other: waterskiing - heavy

Recreational Facilities:
Beach, picnic areas, boat launch

Shoreline Usage (Percent):
Urban (Including Streets):
Residential (Including Lawns): 2%
Golf Courses:
Pasture or Grassland:
Woodland: 3%
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):
Urban:
Residential:
Golf Courses:
Pasture or Grassland: X
Woodland: X
Row Crops: X
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: good
Fishing: good
Conditions and Extent:
Suspended Sediment:
Deposition of Sediment: moderate
Algal Blooms:
Aquatic Weeds: moderate
Taste and/or Odor: moderate
Water Level Fluctuation: large
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS - No information given

Potential Pollution Sources:
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage:
Septic Tanks:
Pasture or Grassland Runoff:
Cropland Runoff:
Feedlot Runoff:
Construction Site Runoff:
Fertilizer or Pesticides from Lawns/Golf Courses:
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl:
Sediment in Lake:
Other:

V. LAKE MANAGEMENT

Comments:

Information Supplied By Warren Brown (1981); *Illinois State Water Survey (1966).

FIGURE 1

PARIS EAST LAKE

EDGAR COUNTY

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Paris East Lake are summarized in Table 2 and plotted in Figure 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Paris East Lake

The average Secchi disc transparency of Paris East Lake was 30.4 inches, which ranked number 46 when the average transparencies of volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976). However, it was in the normal range for Illinois lakes and was compatible with most recreational uses.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Paris East Lake ranged from a minimum of 10 inches at Site 6 on May 28, to a maximum of 42 inches. Secchi readings were below the four feet minimum recommended for swimming on all dates. The average transparencies at Sites 6 and 2 were similar (26.4 and 28.7 inches, respectively), while it was higher at Site 1.

There were seasonal trends in the transparency of Paris East Lake. Lowest transparencies were found on May 28 and were probably the result of increased amounts of suspended sediment, caused by moderate rains which fell during the preceeding 24 hours.

Field observations indicate that the transparency of Paris East Lake was influenced by both algae and suspended sediment. A greenish-brown water color and uniform amounts of algae and suspended sediment were observed on most of the sampling days. Copper sulfate was routinely applied to the lake for algae control.

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) PARIS EAST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	MEAN	STD DEV
05/ 13	42.0	42.0	-1.0	-1.0	-1.0	36.0	40.0	3.5
05/ 28	18.0	14.0	-1.0	-1.0	-1.0	18.0	14.0	4.0
06/ 15	42.0	42.0	-1.0	-1.0	-1.0	24.0	36.0	10.4
06/ 29	36.0	22.0	-1.0	-1.0	-1.0	42.0	33.3	10.3
07/ 22	42.0	12.0	-1.0	-1.0	-1.0	36.0	30.0	15.9
08/ 12	36.0	36.0	-1.0	-1.0	-1.0	24.0	32.0	6.9
09/ 8	42.0	36.0	-1.0	-1.0	-1.0	18.0	32.0	12.5
09/ 23	36.0	24.0	-1.0	-1.0	-1.0	24.0	28.0	6.9
10/ 28	30.0	30.0	-1.0	-1.0	-1.0	24.0	28.0	3.5

SUMMARY STATISTICS

	SITES			LAKE			
MEAN	36.0	28.7	-1.0	-1.0	-1.0	26.4	30.4
STD DEV	7.9	11.3	-1.0	-1.0	-1.0	9.9	10.3
MIN	18.0	12.0	-1.0	-1.0	-1.0	18.0	18.0
MAX	42.0	42.0	-1.0	-1.0	-1.0	42.0	42.0
AV DEPTH	23.6	12.6	0.0	0.0	0.0	10.9	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) PARIS EAST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	SITE 4	SITE 5	SITE 6	MEAN	STD DEV
05/ 13	22.0	10.0	-1.0	-1.0	-1.0	9.0	13.7	7.2
05/ 28	24.0	12.0	-1.0	-1.0	-1.0	9.0	15.0	7.9
06/ 15	26.0	13.0	-1.0	-1.0	-1.0	9.0	16.0	8.9
06/ 29	24.0	8.0	-1.0	-1.0	-1.0	18.0	16.7	8.1
07/ 22	23.0	7.5	-1.0	-1.0	-1.0	18.0	16.2	7.9
08/ 12	24.0	13.0	-1.0	-1.0	-1.0	8.0	15.0	8.2
09/ 8	23.0	10.0	-1.0	-1.0	-1.0	9.0	16.7	7.1
09/ 23	23.0	14.0	-1.0	-1.0	-1.0	9.0	15.3	7.1
10/ 28	23.0	10.0	-1.0	-1.0	-1.0	9.0	16.7	7.1

SUMMARY STATISTICS

	SITES			LAKE			
MEAN	23.6	12.6	-1.0	-1.0	-1.0	10.0	15.7
STD DEV	1.1	3.0	-1.0	-1.0	-1.0	4.0	6.5
MIN	22.0	7.5	-1.0	-1.0	-1.0	8.0	7.5
MAX	26.0	10.0	-1.0	-1.0	-1.0	10.0	26.0
AV DEPTH	23.6	12.6	0.0	0.0	0.0	10.0	

-1 = missing value

See glossary for explanation of Summary Statistics

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) PARIS EAST/EDGAR COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

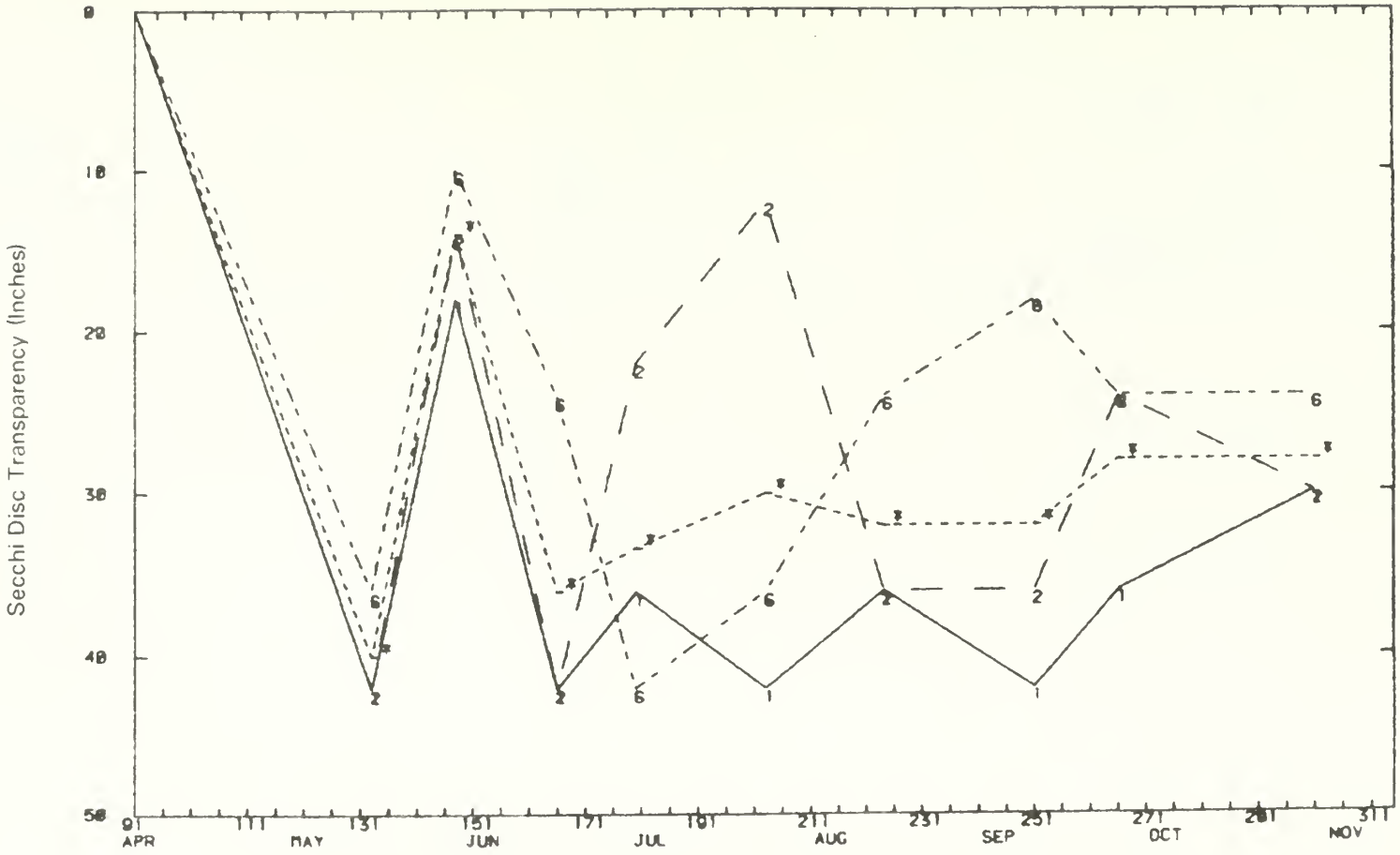

TABLE 4. FIELD OBSERVATIONS, PARIS EAST LAKE, EDGAR COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
5/13/81	WATER COLOR:	grn-brn	grn-brn	grn-brn	CLOUD COVER:	overcast	many clouds	WATER LEVEL OF LAKE:	above normal 3"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain		RECREATIONAL USAGE:	none
	ALGAE:	minimal	minimal	minimal	WAVES:	small	ripple		
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool		
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SE	NW	LAKE MANAGEMENT:	none
	OTHER SUBSTANCES:	none	waterfowl	waterfowl					
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
5/28/81	WATER COLOR:	mod. brown	very brown	mod. brown	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE:	above normal 3"
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	mod. rain	RECREATIONAL USAGE:	none
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	ripple		
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm		
	WEEDS NEAR SHORE:	minimal	minimal	moderate	WIND DIRECTION:	NW	NW	LAKE MANAGEMENT:	none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl					
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
6/15/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	few clouds	clear	WATER LEVEL OF LAKE:	normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE:	fishing, swimming,
	ALGAE:	minimal	minimal	minimal	WAVES:	moderate	small		power boating, waterskiing, picnicking
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	very hot		
	WEEDS NEAR SHORE:	minimal	minimal	minimal	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT:	none
	OTHER SUBSTANCES:	waterfowl	waterfowl	waterfowl					
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:	

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS	
6/29/81	WATER COLOR;	grnsh-brn	grnsh-brn	grn-brn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE:	normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE:	fishing, swimming
	ALGAE:	slight	slight	slight	WAVES:	ripple	ripple		
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	hot	hot		
	WEEDS NEAR SHORE:	minimal	slight	minimal	WIND DIRECTION:	SW	SW	LAKE MANAGEMENT:	
	OTHER SUBSTANCES:	none	waterfowl	waterfowl					
	ODOR:	no odor	no odor	no odor	OBSERVATIONS MADE BY:	Warren Brown		ADDITIONAL COMMENTS:	

TABLE 4. FIELD OBSERVATIONS, PARIS EAST LAKE, EDGAR COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/22/81	WATER COLOR:	grnsh-brn	brnsh-grn	grn-brn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	slight	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing, swimming, power boating
	ALGAE:	minimal	minimal	minimal	WAVES:	ripple	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	hot	LAKE MANAGEMENT: 7/22/81 800# copper sulfate used around dam & first 2 bays E. of dam
	WEEDS NEAR SHORE:	slight	slight	minimal	WIND DIRECTION:	NW	NW	ADDITIONAL COMMENTS: for algae control
	OTHER SUBSTANCES:	waterfowl	none	waterfowl	OBSERVATIONS MADE BY:	Warren Brown		
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/12/81	WATER COLOR:	mod. green	mod. green	mod. green	CLOUD COVER:	clear	few clouds	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	moderate	moderate	moderate	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none
	WEEDS NEAR SHORE:	minimal	slight	slight	WIND DIRECTION:	NW	NW	ADDITIONAL COMMENTS:
	OTHER SUBSTANCES:	none	none	algal mats	OBSERVATIONS MADE BY:	Warren Brown		
	ODOR:	no odor	no odor	fishy				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/8/81	WATER COLOR:	brnsh.-grn	brnsh.-grn	brnsh.-grn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: above normal 1"
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	vry.lt.rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	small	small	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none
	WEEDS NEAR SHORE:	minimal	minimal	slight	WIND DIRECTION:	NW	SW	ADDITIONAL COMMENTS:
	OTHER SUBSTANCES:	none	none	none	OBSERVATIONS MADE BY:	Warren Brown		
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
9/23/81	WATER COLOR:	brnsh-grn		brnsh-grn	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	minimal		minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal		minimal	WAVES:	ripple	ripple	
	WEEDS AT SAMPLE SITE:	minimal		minimal	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none
	WEEDS NEAR SHORE:	minimal		moderate	WIND DIRECTION:	E	NW	ADDITIONAL COMMENTS:
	OTHER SUBSTANCES:	none		none	OBSERVATIONS MADE BY:	Warren Brown		
	ODOR:	no odor		no odor				

TABLE 4. FIELD OBSERVATIONS, PARIS EAST LAKE, EDGAR COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/23/8	WATER COLOR:	brnsh-grn	brnsh-grn	brnsh-grn	CLOUD COVER:	clear	overcast	WATER LEVEL OF LAKE: above normal
	SEDIMENT:	slight	slight	slight	PRECIPITATION:	no rain	lt. rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	ripple	
	WEEDS AT SAMPLE SITE.	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	LAKE MANAGEMENT: 9/29/81 CUSO4 in lake 100#
	WEEDS NEAR SHORE:	minimal	minimal	slight	WIND DIRECTION:	N.W.	N.	ADDITIONAL COMMENTS: to control algae growth
	OTHER SUBSTANCES:	waterfowl	waterfowl	none	OBSERVATIONS MADE BY: Warren Brown			
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			LAKE MANAGEMENT:
	WEEDS NEAR SHORE:				WIND DIRECTION:			
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			LAKE MANAGEMENT:
	WEEDS NEAR SHORE:				WIND DIRECTION:			
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR;				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			LAKE MANAGEMENT:
	WEEDS NEAR SHORE:				WIND DIRECTION:			
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Paris East Lake (estimated at twice the Secchi depth) ranged from 3.0 - 7.0 feet at Site 1, 2.0 - 7.0 feet at Site 2, from 1.7 - 7.0 feet at Site 6. Since Site 1 on Paris East Lake is deep enough to thermally stratify and had a euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters.

In the absence of dissolved oxygen, undesirable substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese accumulate in the bottom waters. These substances can contribute to serious taste and odor problems in drinking water if water supply is taken from near the lake bottom during summer stratification. When the substances which have accumulated in the bottom waters during stratification periods are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Paris East Lake, a public water supply and recreational impoundment in east central Illinois was sampled on nine dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Warren Brown recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Paris East Lake (30.4 inches) ranked 46th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). Although this average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health; it was in the normal range for Illinois lakes and was compatible with most recreational uses.

Site 1 on Paris East Lake is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Paris East Lake is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input.

In-lake management may also warrant consideration. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem-causing blue-greens, reduce the need for copper sulfate, help alleviate taste and odor problems and improve fishing.

Continued monitoring is recommended for Paris East Lake. Consistent data gathered over a period of years is necessary to more fully document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

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DS:jab/sp3873C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

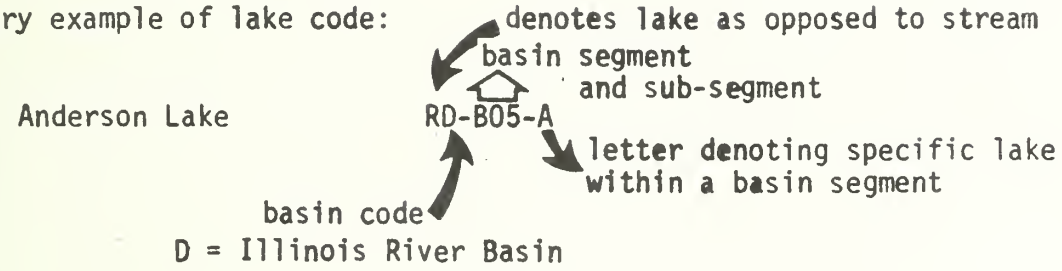
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

LAKE PARADISE, COLES COUNTY, ILLINOIS

A Cooperative Citizen-
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Lake Paradise is a 166 acre impoundment owned by the City of Mattoon, Coles County, Illinois. The lake, which was constructed by the damming of the Little Wabash River in 1909, has a maximum depth of 23 feet, an average depth of 8.5 feet and a storage capacity of 1,407 acre feet (Table 1).

Lake Paradise serves as a potable water supply for the City. Recreational uses associated with the lake include fishing, powerboating, rowboating or canoeing, camping and waterfowl observation. Access is unlimited and free.

The 11,585 acre watershed of Lake Paradise is estimated to be 70% row crops. The lake shoreline is primarily wooded.

Deposition of sediment is considered a substantial problem, while suspended sediment, aquatic weeds, taste and odor, and water level fluctuation are considered moderate problems for Lake Paradise. Septic tanks, pasture or grassland runoff, cropland runoff, and sediment in the lake are cited as potential pollution sources.

TABLE 1. LAKE ASSESSMENT SUMMARY, PARADISE LAKE, COLES COUNTY, ILLINOIS (RC-A09-G).

1. GENERAL INFORMATION

River Basin: Little Wabash
Segment: A09

Ownership: City of Mattoon

Surface Area (Acres): 166*
Watershed Area (Acres): 11,585*
Maximum Depth (Feet): 23*
Average Depth (Feet): 8.5*
Storage Capacity (Acre/Feet): 1407*
Inflowing Stream(s): Little Wabash
Outflowing Stream(s): Little Wabash
Water Retention Time: 0.146 years
Lake Type: dammed stream
Year Constructed: 1909

II. USAGE

Public Access: yes
Lake Usage:
- Potable Water Supply: heavy
- Industrial Water Supply: none
- Agricultural Water Supply: light
- Cooling Water: none
- Recreation: moderate
  - Fishing: moderate
  - Swimming: none
  - Power Boating: moderate
  - Row Boating or Canoeing: moderate
  - Sailboating: light
  - Camping: moderate
  - Picnicking: heavy
  - Waterfowl Hunting: none
  - Waterfowl Observation: moderate
  - Other:

Recreational Facilities:
Picnic area, campgrounds, boat launch, bait shop

Shoreline Usage (Percent):
- Urban (Including Streets):
- Residential (Including Lawns): 40%
- Golf Courses:
- Pasture or Grassland:
- Woodland: 45%
- Row Crops:
- Wetland: 15%
- Other:

Watershed Usage (Percent):
- Urban: 10%
- Residential:
- Golf Courses:
- Pasture or Grassland: 15%
- Woodland: 5%
- Row Crops: 70%
- Wetland:
- Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: fair
Fishing: poor
Conditions and Extent:
- Suspended Sediment: moderate
- Deposition of Sediment: large
- Algal Blooms: slight
- Aquatic Weeds: moderate
- Taste and/or Odor: moderate
- Water Level Fluctuation: moderate
- Fishkills: slight
- Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
- Sewage Treatment Plant Effluent:
- Industrial Discharge:
- Urban Storm Drainage:
- Septic Tanks: yes
- Pasture or Grassland Runoff: yes
- Cropland Runoff: yes
- Feedlot Runoff:
- Construction Site Runoff:
- Fertilizer or Pesticides from Lawns/Golf Courses:
- Orchards:
- Forestry Operations Runoff:
- Mining:
- Waterfowl:
- Sediment in Lake: yes
- Other:

V. LAKE MANAGEMENT

Comments:

Information Supplied By David Bergman (1981); *Illinois State Water Survey, Sediment Survey (1980)

Assessment information on Lake Paradise was provided by David Bergman, the Water Treatment Plant Operator and the Illinois State Water Survey. Monitoring was performed by David Bergman and Bill Hammel. Secchi disc transparency, total depth, and field observations were recorded at three sites (located in Fig. 1) on five dates in 1981.

RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Paradise Lake are summarized in Table 2 and plotted in Fig. 2. Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Lake Paradise

The average Secchi disc transparency of Lake Paradise was 13.1 inches, which ranked number 63 when the average transparencies of the volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was less than the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976) and was in the range generally associated with with use impairment problems in Illinois lakes. Above average rainfall during the sampling periods may have resulted in lower than normal transparency.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Paradise Lake ranged from a maximum of 24 inches at Site 1 on May 5 to a minimum of 4 inches at Site 3 on July 6.

As is typical of Illinois reservoirs, a spatial trend of increasing transparency from the lake headwaters to the dam was apparent in Paradise Lake. The average transparencies of Sites 3, 2, and 1 were 10.0, 12.8, and 16.4 inches, respectively.

The lake was extremely turbid throughout the May-October sampling. Field observations indicated that the lack of transparency was primarily due to sediment, particularly at Site 3. The sediment load tended to settle out in the upper end of the lake so that the water became clearer towards the dam. This was especially apparent on July 6, when a very brown water color and moderate amounts of suspended sediment were noted at Sites 3 and 2, while a moderate brown water color and slight amounts of suspended sediment were observed at Site 1. The transparency increased from 4 inches to Site 3 to 18 inches at Site 1.

FIGURE 1

PARADISE LAKE

COLES COUNTY

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) PARADISE/COLES COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 5	24.0	18.0	16.0	19.3	4.2
07/ 6	18.0	6.0	4.0	9.3	7.6
08/ 6	12.0	14.0	18.0	12.0	2.0
08/ 22	14.0	13.0	12.0	13.0	1.0
10/ 9	14.0	13.0	8.0	11.7	3.2

SUMMARY STATISTICS

	SITES			LAKE
MEAN	16.4	12.0	10.0	13.1
STD DEV	4.8	4.3	4.5	5.0
MIN	12.0	6.0	4.0	4.0
MAX	24.0	18.0	16.0	24.0
AV DEPTH	10.8	9.6	3.0	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) PARADISE/COLES COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 5	20.0	10.0	3.0	11.0	8.5
07/ 6	20.0	9.0	3.0	10.7	8.6
08/ 6	20.0	10.0	3.0	11.0	8.5
08/ 22	20.0	9.0	3.0	10.7	8.6
10/ 9	19.0	10.0	3.0	10.7	8.0

SUMMARY STATISTICS

	SITES			LAKE
MEAN	19.8	9.6	3.0	10.8
STD DEV	0.4	0.5	0.0	7.2
MIN	19.0	9.0	3.0	3.0
MAX	20.0	10.0	3.0	20.0
AV DEPTH	19.8	9.6	3.0	

-1 = missing value

See glossary for explanation of Summary Statistics.

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) PARADISE/COLES COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

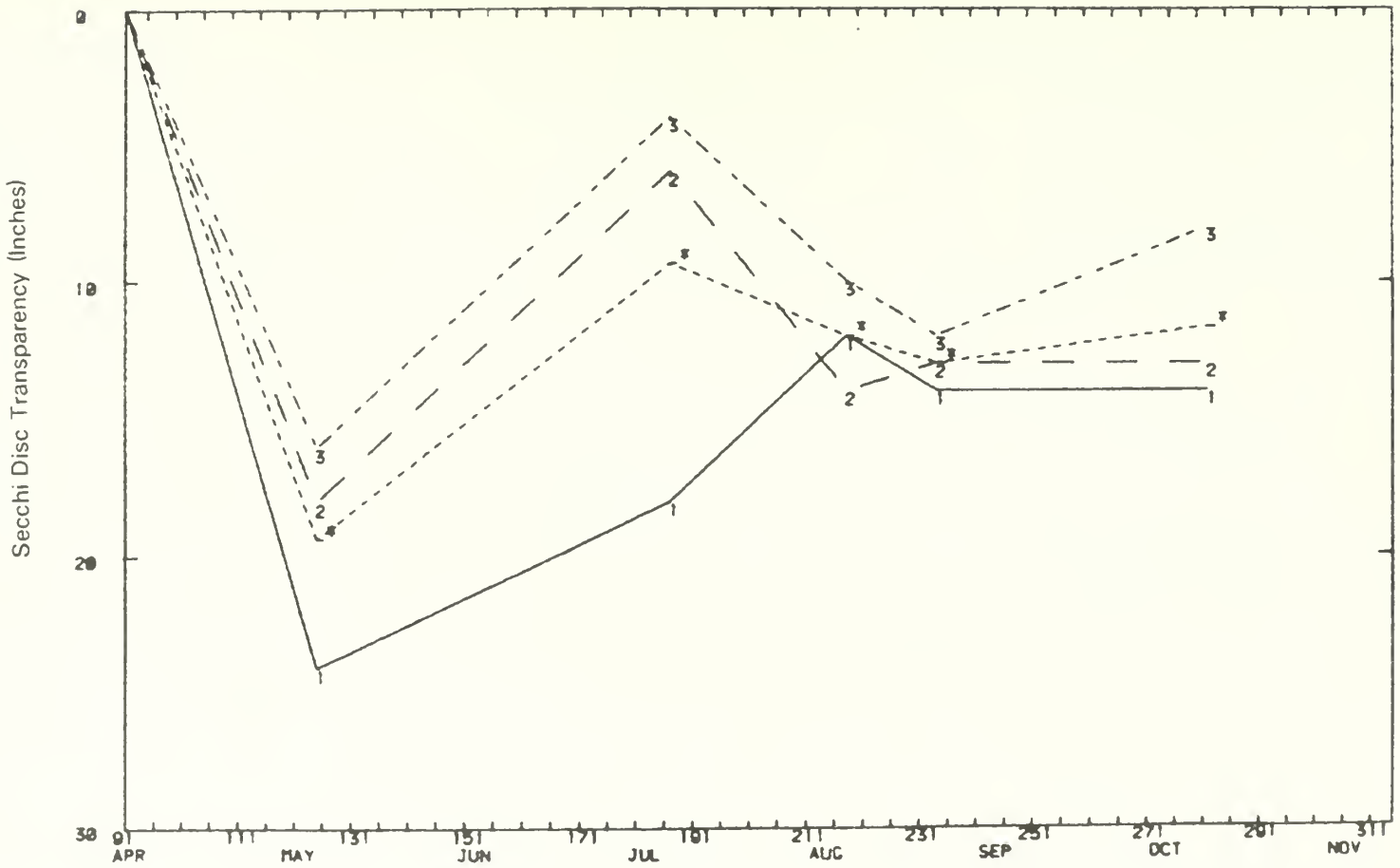

TABLE 4. FIELD OBSERVATIONS, LAKE PARADISE, COLES COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/8/81	WATER COLOR:	mod. brown	mod. brown	mod. brown
	SEDIMENT:	slight	slight	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	slight	moderate
	OTHER SUBSTANCES:	none	dead fish waterfowl	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	overcast	many clouds
PRECIPITATION:	mod. rain	no rain
WAVES:	calm	small
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	W	SW
OBSERVATIONS MADE BY:	David Bergman Bill Hammel	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
7/6/81	WATER COLOR:	mod. brown	very brown	very brown
	SEDIMENT:	slight	moderate	moderate
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	slight	moderate	large
	OTHER SUBSTANCES:	waterfowl	refuse	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	overcast
PRECIPITATION:	no rain	v. lt. rain
WAVES:	ripple	ripple
AIR TEMPERATURE:	hot	warm
WIND DIRECTION:	NE	N
OBSERVATIONS MADE BY:	David Bergman	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, power boating, row boating/canoeing, camping, picnicking
LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/6/81	WATER COLOR:	grnsh-br.	grnsh-br.	grnsh-br.
	SEDIMENT:	minimal	minimal	minimal
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal
	WEEDS NEAR SHORE:	minimal	moderate	large
	OTHER SUBSTANCES:	none	none	waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	few clouds
PRECIPITATION:	lt. rain	no rain
WAVES:	ripple waves	ripple waves
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	southwest	southwest
OBSERVATIONS MADE BY:	David Bergman	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
8/22/81	WATER COLOR:	grnsh-br.	green-br.	brnsh-gr.
	SEDIMENT:	minimal	minimal	slight
	ALGAE:	minimal	minimal	minimal
	WEEDS AT SAMPLE SITE:	minimal	minimal	slight
	WEEDS NEAR SHORE:	minimal	moderate	large
	OTHER SUBSTANCES:	none	none	none
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	no rain	no rain
WAVES:	calm	calm
AIR TEMPERATURE:	cold	cold
WIND DIRECTION:	normal	normal
OBSERVATIONS MADE BY:	David Bergman	

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, power boating row boating or canoeing, picknicking.

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, LAKE PARADISE, COLES COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
10/9/61	WATER COLOR:	grnsh-brn	grnsh-brn	brnsh-grn	CLOUD COVER:	clear	few clouds	WATER LEVEL OF LAKE: above normal
	SEDIMENT:	minimal	minimal	minimal	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: fishing
	ALGAE:	minimal	minimal	minimal	WAVES:	calm	calm	
	WEEDS AT SAMPLE SITE:	minimal	minimal	minimal	AIR TEMPERATURE:	cool	cool	
	WEEDS NEAR SHORE:	slight	slight	large	WIND DIRECTION:	E.	S.W.	LAKE MANAGEMENT:
	OTHER SUBSTANCES:	none	waterfowl	waterfowl				
					OBSERVATIONS MADE BY: David Bergman			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:							
					OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

There were seasonal differences in the transparency of Paradise Lake. Lower transparencies were generally recorded in midsummer to early fall and were probably influenced by algal blooms. Field observations of water color indicate that algae becomes more of a problem during this time. The color of the water was moderate to very brown in May and July and greenish-brown in August and October.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Paradise Lake (estimated at twice the Secchi depth) ranged from 2.0 - 4.0 feet at Site 1, 1.0 - 3.0 feet at Site 2, and 0.7 - 2.7 feet at Site 3. Since Sites 1 and 2 were deep enough to thermally stratify and had a euphotic zone that was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters of these sites during summer stratification.

In the absence of dissolved oxygen, substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese may accumulate in the bottom waters. These substances can contribute to serious taste and odor problems in drinking water if water supply is taken from near the lake bottom during summer stratification. When these substances are distributed throughout the lake during mixing periods, they can trigger nuisance algal blooms, aquatic weed growth, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Lake Paradise, a public water supply and recreational impoundment in east-central Illinois, was sampled on five dates between May 1 and October 31, 1981 under the Illinois EPA's Volunteer Lake Monitoring Program. Volunteer David Bergman recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Lake Paradise (13.1 inches) ranked 63rd of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). This average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health and was in the range generally associated with use impairment problems for Illinois lakes.

The lake was extremely turbid throughout the sample period, with transparency influenced primarily be sediment, but also by algae at times.

Site 1 on Lake Paradise is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Lake Paradise is undergoing the process of eutrophication, as evidenced by transparency readings and field observations of algae and sediment problems. Protection from further degradation is critical. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes further degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks and fertilization of lawns should also be investigated and minimized.

In-lake management may also warrant consideration. Drawing oxygenated water from the upper strata for water supply use may help alleviate taste and odor problems. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem causing blue-greens, help to alleviate taste and odor problems, and improve fishing.

Continued monitoring is recommended for Lake Paradise. Consistent data gathered over a period of a year is necessary to document and evaluate water quality trends, identify problems, and evaluate lake/watershed management strategies.

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DS:jab/sp2161c

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

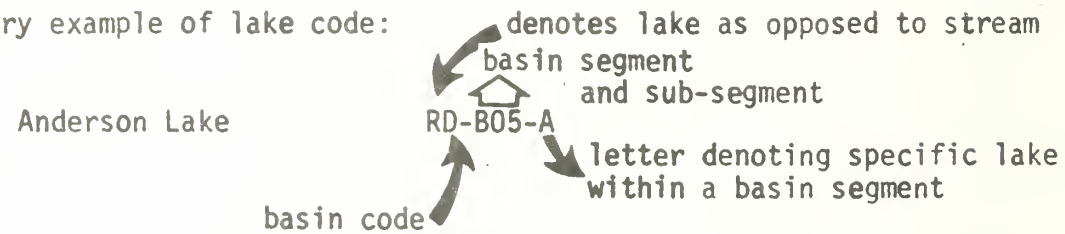
water retention time - water residence time; period of time a mass of water remains in an impoundment.

watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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MONITORING PROGRAM REPORT

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OMAHA LAKE / GALLATIN CO.

1981 VOLUNTEER LAKE MONITORING PROGRAM REPORT

FOR

OMAHA LAKE, GALLATIN COUNTY, ILLINOIS

A Cooperative Citizen -
Illinois Environmental Protection Agency
Project

May, 1982
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62706

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ACKNOWLEDGEMENTS

This is one of 87 reports prepared for lakes in the 1981 Volunteer Lake Monitoring Program. It represents the coordinated effort of many individuals.

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Program coordination was provided by Donna Sefton for the Illinois EPA's Ambient Monitoring Unit and Carol Beim for the Public Participation Section.

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Assessment and monitoring information was provided by approximately 140 volunteers throughout the state.

Data handling was performed by John Little, Jill Hardin, Marilyn Budd, Lori Whalen, Cora Stockton, and Karen Janssen. Data analyses were performed and tabular and graphical outputs obtained by John Little using programs developed for the Tektronix desk top computer terminal by Dr. David J. Schaeffer and Vladimir Chernomordikov.

Donna Sefton, Howard Essig, John Little, John Lesnak, Carol Beim, and Bob Hagele wrote portions of the lake reports. Reports were edited by Planning Section and Public Participation staff, particularly Marilyn Budd and Mary Anderson. The contributions of Robert Clarke and Thomas Davenport are recognized.

Reports were typed by Word Processing under the direction of Norma Kraus and Diane Woodyard while Field Observations and Lake Assessment Summaries were typed by Betty Pennington, Lori Whalen, Karen Janssen, and Marilyn Budd.

INTRODUCTION

A cooperative volunteer lake monitoring effort was initiated by the Illinois EPA in 1981 as part of an overall self-help, service program being developed for lakes. In addition to expanding the Agency's lakes data base with information on present water quality and trends, the program was designed to involve citizens in learning about a lake so they could make more informed decisions regarding its use, protection, and enhancement.

Citizens selected a lake they were concerned about and were trained to measure water clarity or transparency by recording the depth to which a Secchi disc (an eight-inch diameter metal plate painted black and white in alternating quadrants) was visible. They also measured total depth and recorded field observations from a boat at three sites on their chosen lake. Readings were to be taken twice a month from May through October and reported to the Agency on special data forms. The Secchi disc, data forms, and postage paid envelopes were provided by the Agency. Volunteers were required to have a boat with an anchor to perform the monitoring.

Approximately 140 volunteers participated in monitoring 87 lakes in 1981. The sampling data were computerized to facilitate analyses and preparation of tables and graphs for reports. A statewide report entitled, "Volunteer Lake Monitoring, 1981", summarized all the data for the volunteer lakes. Individual reports were also prepared for each of the 87 lakes monitored by volunteers in 1981.

BACKGROUND

Omaha Lake is a 26 acre impoundment owned by the City of Omaha in Gallatin County, Illinois. The lake, which was constructed by the damming of an unnamed stream in 1964, has a maximum depth of 16 feet, an average depth of 7 feet and a storage capacity of 184 acre-feet (Table 1)

Omaha Lake serves as a potable water supply for the City. Access is unlimited and free. The 154 acre watershed is estimated to be 95% pasture or grassland. The lake shoreline is primarily grassland and woodland. Algal blooms are considered a moderate problem. Pasture or grassland runoff, cropland runoff, waterfowl, and sediment in the lake are cited as potential pollution sources.

Assessment and monitoring information was provided by Robert Langley, the Water Treatment Plant Operator. Secchi disc depth, total depth, and field observations were recorded at three sites (located in Fig. 1) on 13 dates in 1981.

TABLE 1. LAKE ASSESSMENT SUMMARY, OMAHA LAKE, GALLATIN COUNTY, ILLINOIS (RA-A01-S).

I. GENERAL INFORMATION

River Basin: Ohio
Segment: A01
Latitude:
Longitude:
Ownership:

Surface Area (Acres): 26
Watershed Area (Acres): 154*
Maximum Depth (Feet): 16
Average Depth (Feet): 7.0*
Storage Capacity (Acre/Feet): 184*
Inflowing Stream(s):
Outflowing Stream(s):
Water Retention Time: 0.859* year
Lake Type: man-made (dammed stream*)
Year Constructed: 1964

II. USAGE

Public Access: yes
Lake Usage:
Potable Water Supply: moderate
Industrial Water Supply: none
Agricultural Water Supply: none
Cooling Water: none
Recreation: light
Fishing: light
Swimming: none
Power Boating: none
Row Boating or Canoeing: light
Sailboating: none
Camping: light
Picnicking: light
Waterfowl Hunting: none
Waterfowl Observation: light
Other:

Recreational Facilities:
picnic areas, campgrounds & boat launch

Shoreline Usage (Percent):
Urban (Including Streets):
Residential (Including Lawns):
Golf Courses:
Pasture or Grassland: 5%
Woodland: 50%
Row Crops:
Wetland:
Other:

Watershed Usage (Percent):
Urban:
Residential:
Golf Courses:
Pasture or Grassland: 95%
Woodland:
Row Crops: 5%
Wetland:
Other:

III. WATER QUALITY AND PROBLEMS

General Water Quality: excellent
Fishing: good
Conditions and Extent:
Suspended Sediment: slight
Deposition of Sediment: slight
Algal Blooms: moderate
Aquatic Weeds: slight
Taste and/or Odor: minimal
Water Level Fluctuation: slight
Fishkills: minimal
Other:

IV. CAUSES OF WATER QUALITY PROBLEMS

Potential Pollution Sources:
Sewage Treatment Plant Effluent:
Industrial Discharge:
Urban Storm Drainage:
Septic Tanks:
Pasture or Grassland Runoff: yes
Cropland Runoff: yes
Feedlot Runoff:
Construction Site Runoff:
Fertilizer or Pesticides from Lawns/Golf Courses:
Orchards:
Forestry Operations Runoff:
Mining:
Waterfowl:
Sediment in Lake: yes
Other:

V. LAKE MANAGEMENT

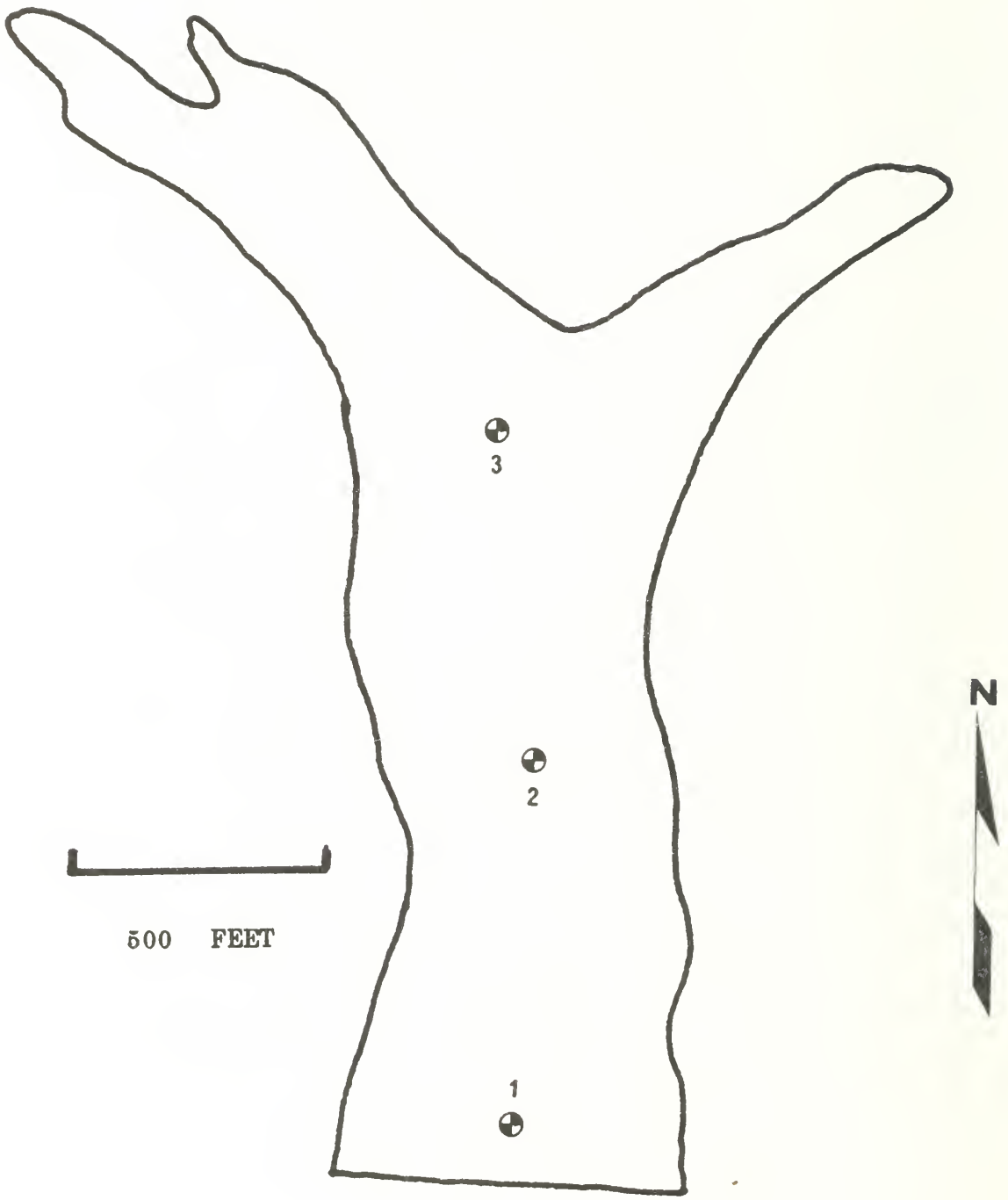
Comments:

*Information Supplied By Robert Langley (1981) * Illinois Department of Conservation (1977).

FIGURE 1

OMAHA LAKE

GALLATIN COUNTY



RESULTS AND DISCUSSION

In this section, monitoring results will be presented for the lake and compared to those for other lakes in the volunteer program. Then spatial (within lake) and seasonal differences in transparency will be examined and related to field observations. Results will also be discussed in terms of lake uses. For an explanation of unfamiliar terms or concepts presented here, refer to the report "Volunteer Lake Monitoring, 1981", Section IV "Understanding Illinois' Lakes."

The Secchi monitoring data for Omaha Lake are summarized in Table 2 and plotted in Fig. 2. (Due to computer program limitations, the November 10 sampling data could not be included in the tables and graphs.) Total depth data are provided in Table 3, while field observations are summarized in Table 4.

Transparency of Omaha Lake

The average Secchi disc transparency of Omaha Lake was 46.8 inches, which ranked number 26 when the average transparencies of volunteer lakes were ranked from clearest (number 1 at 137.8 inches) to least transparent (number 87 at 7.3 inches). This average transparency was near the four feet minimum recommended for swimming by the Illinois Department of Public Health (1976). It was in the normal range for Illinois lakes and compatible with most recreational uses.

A lengthy drought preceded the 1981 sampling. Thus, the water level of Raccoon Lake was 32 inches below normal in early May, leaving Site 3 dry. This site was not sampled until May 25 after heavy rain had increased the water level of the reservoir.

Spatial and Seasonal Differences in Transparency

The Secchi disc transparency of Omaha Lake ranged from a maximum of 78 inches at Site 1 on June 29 and August 27 to a minimum of 18 inches at Site 3 on May 25, June 29, and August 17.

Differences in clarity (transparency) were evident in different sections of Omaha Lake. Transparency averaged 63 inches, 52 inches, and 26.2 inches at Sites 1, 2, and 3, respectively. Readings at Site 1 were greater than the four feet minimum recommended for swimming on all sampling dates except August 17; while at Site 3, they were less than four feet at all times. The lower Secchi readings at Site 3 were probably related in part to the shallow depth of the site, which allowed wind and wave activity to stir up the bottom sediment. It may also reflect the input of nutrients and sediment in the vicinity.

TABLE 2

SECCHI DISC TRANSPARENCY (INCHES) OMAHA/GALLATIN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 4	54.0	42.0	-1.0	48.0	8.5
05/ 25	24.0	48.0	18.0	30.0	15.0
06/ 18	72.0	60.0	24.0	52.0	25.0
06/ 29	78.0	72.0	18.0	56.0	33.0
07/ 16	60.0	48.0	24.0	44.0	18.3
07/ 28	54.0	36.0	30.0	40.0	12.5
08/ 17	42.0	48.0	18.0	36.0	15.0
08/ 27	78.0	60.0	24.0	54.0	27.5
09/ 10	48.0	36.0	36.0	40.0	6.0
09/ 28	72.0	60.0	24.0	52.0	25.0
10/ 13	72.0	54.0	36.0	54.0	18.0
10/ 28	72.0	60.0	36.0	56.0	18.3

SUMMARY STATISTICS

	SITES			LAKE
MEAN	60.5	52.0	26.2	46.0
STD DEV	16.7	11.0	7.2	18.9
MIN	24.0	36.0	18.0	18.0
MAX	78.0	72.0	36.0	78.0
AV DEPTH	13.4	8.6	3.0	

-1 = missing value

See glossary for explanation of Summary Statistics.

TABLE 3

DEPTH OF SITE (FEET) OMAHA/GALLATIN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)

DATE	SITE 1	SITE 2	SITE 3	MEAN	STD DEV
05/ 4	12.0	3.5	-1.0	7.8	6.0
05/ 25	13.0	7.0	3.0	7.7	5.0
06/ 18	15.0	12.0	5.0	10.7	5.1
06/ 29	14.5	12.0	3.0	9.8	6.0
07/ 16	14.0	13.0	3.0	10.0	6.1
07/ 28	13.0	7.0	4.5	8.2	4.4
08/ 17	11.0	9.5	2.5	7.7	4.5
08/ 27	14.0	10.0	3.0	9.0	5.6
09/ 10	14.0	6.0	5.0	8.3	4.9
09/ 28	13.5	10.0	5.0	9.5	4.3
10/ 13	13.5	6.5	5.0	8.3	4.5
10/ 28	13.0	7.6	4.0	8.0	4.6

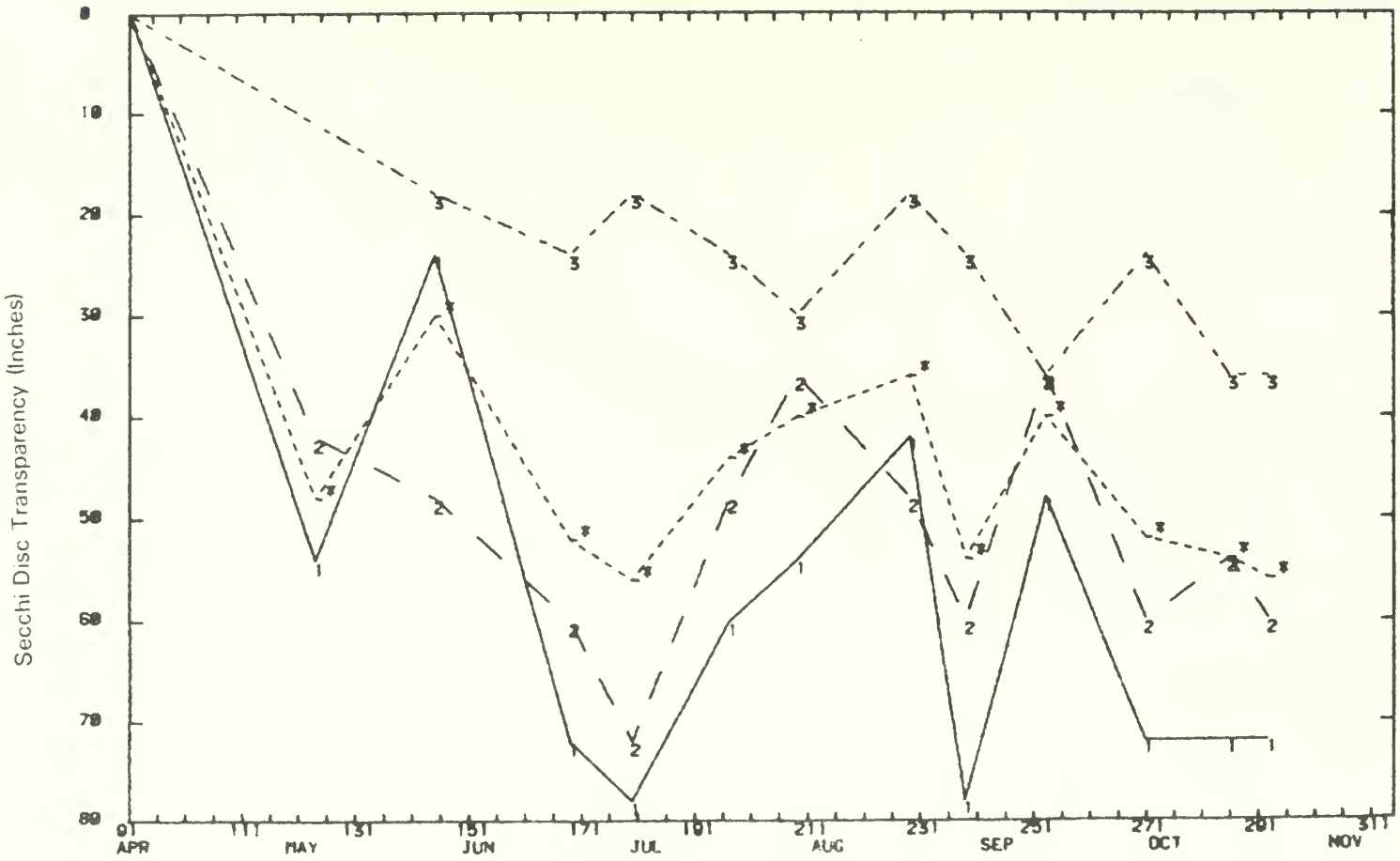
SUMMARY STATISTICS

	SITES			LAKE
MEAN	13.4	8.6	3.9	8.8
STD DEV	1.1	2.9	1.0	4.3
MIN	11.0	3.5	2.5	2.5
MAX	15.0	13.0	5.0	15.0
AV DEPTH	13.4	8.6	3.9	

-1 = missing value

FIGURE 2

SECCHI DISC TRANSPARENCY (INCHES) OMAHA/GALLATIN COUNTY, ILLINOIS (VOLUNTEER DATA 1981)



Day of Year

KEY

1 Site 1
2 Site 2
3 Site 3
* Mean (Average)

TABLE 4. FIELD OBSERVATIONS, OMAHA LAKE, GALLATIN COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/4/81	WATER COLOR:	grnsh-brn	grnsh-brn	
	SEDIMENT:	slight	slight	
	ALGAE:	moderate	moderate	
	WEEDS AT SAMPLE SITE:	minimal	moderate	
	WEEDS NEAR SHORE:	moderate	moderate	
	OTHER SUBSTANCES:	algal col. waterfowl	algal col. waterfowl	
	ODOR:	no odor	no odor	

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	hazy
PRECIPITATION:	no rain	no rain
WAVES:	small	small
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:	S	S
OBSERVATIONS MADE BY:	Robert Langley	

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal 32"
RECREATIONAL USAGE: none

LAKE MANAGEMENT:

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
5/25/81	WATER COLOR:	mod. green	mod. green	mod. green
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	moderate	moderate	moderate
	WEEDS NEAR SHORE:	moderate	moderate	moderate
	OTHER SUBSTANCES:	algal col. waterfowl	algal col. waterfowl	algal col waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	few clouds	overcast
PRECIPITATION:	no rain	heavy rain
WAVES:	calm	moderate
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		
OBSERVATIONS MADE BY:	Robert Langley	

OTHER COMMENTS

WATER LEVEL OF LAKE: below normal
RECREATIONAL USAGE: fishing, row boating/canoeing, camping, picnicking

LAKE MANAGEMENT: none

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/18/81	WATER COLOR:	lt. green	lt. green	lt. green
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	moderate	moderate	moderate
	WEEDS NEAR SHORE:	large	large	large
	OTHER SUBSTANCES:	algal col waterfowl	algal col. waterfowl	algal col. waterfowl
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	many clouds
PRECIPITATION:	no rain	mod. rain
WAVES:	ripple	moderate
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		
OBSERVATIONS MADE BY:	Robert Langley	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, camping, picnicking

LAKE MANAGEMENT: none
copper sulfate herbicide

ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
6/29/81	WATER COLOR;	lt. green	lt. green	lt. green
	SEDIMENT:	moderate	moderate	moderate
	ALGAE:	moderate	moderate	moderate
	WEEDS AT SAMPLE SITE:	slight	slight	large
	WEEDS NEAR SHORE:	large	large	large
	OTHER SUBSTANCES:	algal col.	algal col.	algal col.
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	v. lt. rain	v. lt. rain
WAVES:	calm	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		
OBSERVATIONS MADE BY:	Robert Langley	

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, camping, picnicking

LAKE MANAGEMENT: none
copper sulfate herbicide

ADDITIONAL COMMENTS: Lost secchi dish, made new one.

TABLE 4. FIELD OBSERVATIONS, OMAHA LAKE, GALLATIN COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/16/81	WATER COLOR:	grnsh-brn	grn-brn	brnsh-grn	CLOUD COVER:	few clouds	many clouds	WATER LEVEL OF LAKE:
	SEDIMENT:	moderate	slight		PRECIPITATION:	v. lt. rain	no rain	RECREATIONAL USAGE: fishing, camping, picnicking
	ALGAE:	moderate	moderate	moderate	WAVES:	ripple	moderate	
	WEEDS AT SAMPLE SITE:	slight	slight	moderate	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none copper sulfate herbicide
	WEEDS NEAR SHORE:	large	large	large	WIND DIRECTION:			
	OTHER SUBSTANCES:	algal mats waterfowl	algal mats waterfowl	algal mats waterfowl	OBSERVATIONS MADE BY:	Robert Langley		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
7/28/81	WATER COLOR:	lt. green	lt. green	lt. green	CLOUD COVER:	many clouds	overcast	WATER LEVEL OF LAKE: normal
	SEDIMENT:	slight	slight	slight	PRECIPITATION:	no rain	heavy rain	RECREATIONAL USAGE: fishing, camping, picnicking
	ALGAE:	slight	slight	slight	WAVES:	calm	moderate	
	WEEDS AT SAMPLE SITE:	slight	slight	slight	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none copper sulfate herbicide
	WEEDS NEAR SHORE:	moderate	moderate	moderate	WIND DIRECTION:			
	OTHER SUBSTANCES:	duckweed	algal col.	duckweed	OBSERVATIONS MADE BY:	Robert Langley		ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/17/81	WATER COLOR:	lt. green	lt. green	mod. green	CLOUD COVER:	many clouds	few clouds	WATER LEVEL OF LAKE: normal
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	no rain	no rain	RECREATIONAL USAGE: camping, picnicking fishing
	ALGAE:	slight	slight	slight	WAVES:	small	small	
	WEEDS AT SAMPLE SITE:	moderate	moderate	moderate	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: none copper sulfate herbicide
	WEEDS NEAR SHORE:	large	large	large	WIND DIRECTION:			
	OTHER SUBSTANCES:	algal col.	algal mats	duckweed	OBSERVATIONS MADE BY:	Robert Langley		ADDITIONAL COMMENTS: Coon tail is very bad from bank to about 20'. Otherwise lake is in very good shape
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
8/27/81	WATER COLOR;	mod. green	lt. green	mod. green	CLOUD COVER:	many clouds	overcast	WATER LEVEL OF LAKE: above normal
	SEDIMENT:	minimal	minimal	slight	PRECIPITATION:	mod. rain	no rain	RECREATIONAL USAGE: fishing, camping, picnicking
	ALGAE:	slight	slight	slight	WAVES:	ripple	small	
	WEEDS AT SAMPLE SITE:	slight	moderate	moderate	AIR TEMPERATURE:	warm	warm	LAKE MANAGEMENT: copper sulfate herbicide
	WEEDS NEAR SHORE:	large	large	large	WIND DIRECTION:	S	S	
	OTHER SUBSTANCES:	algal col. duckweed	algal col. duckweed	algal col. duckweed	OBSERVATIONS MADE BY:	Robert Langley		ADDITIONAL COMMENTS:
	ODOR:							

TABLE 4. FIELD OBSERVATIONS, OMAHA LAKE, GALLATIN COUNTY, ILLINOIS.

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/10/81	WATER COLOR:			
	SEDIMENT:			
	ALGAE:			
	WEEDS AT SAMPLE SITE:			
	WEEDS NEAR SHORE:			
	OTHER SUBSTANCES:			
	ODOR:			

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	hazy	few clouds
PRECIPITATION:	no rain	no rain
WAVES:	calm	calm
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		

OBSERVATIONS MADE BY: Robert Langley

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, camping, picnicking

LAKE MANAGEMENT: none
copper sulfate herbicide
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
9/28/81	WATER COLOR:	lt. green	mod. green	mod. green
	SEDIMENT:	slight	slight	slight
	ALGAE:	slight	slight	slight
	WEEDS AT SAMPLE SITE:	moderate	moderate	moderate
	WEEDS NEAR SHORE:	slight	slight	slight
	OTHER SUBSTANCES:	algal col. duckweed	algal col. duckweed	algal.col. duckweed
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	no rain	v. lt. rain
WAVES:	calm	ripple
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:		

OBSERVATIONS MADE BY: Robert Langley

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, camping, picnicking

LAKE MANAGEMENT: none
copper sulfate herbicide
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
10/13/8	WATER COLOR:	lt. green	lt. green	mod. green
	SEDIMENT:	slight	slight	moderate
	ALGAE:	slight	slight	moderate
	WEEDS AT SAMPLE SITE:	moderate	slight	moderate
	WEEDS NEAR SHORE:	moderate	slight	moderate
	OTHER SUBSTANCES:	algal col. duckweed	algal mats	algal mats
	ODOR:	no odor	no odor	no odor

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	many clouds	hazy
PRECIPITATION:	v. lt. rain	no rain
WAVES:	moderate	ripple
AIR TEMPERATURE:	warm	warm
WIND DIRECTION:		

OBSERVATIONS MADE BY: Robert Langley

OTHER COMMENTS

WATER LEVEL OF LAKE:
RECREATIONAL USAGE: fishing, camping, picnicking

LAKE MANAGEMENT: none
copper sulfate herbicide
ADDITIONAL COMMENTS:

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3
10/20/8	WATER COLOR;	clear	lt. green	mod.green
	SEDIMENT:	slight	slight	moderate
	ALGAE:	slight	moderate	moderate
	WEEDS AT SAMPLE SITE:	slight	slight	moderate
	WEEDS NEAR SHORE:	moderate	slight	moderate
	OTHER SUBSTANCES:	algal col. waterfowl	algal col. waterfowl	algal col. waterfowl
	ODOR:	no odor	no odor	no odr

WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS
CLOUD COVER:	clear	hazy
PRECIPITATION:	no rain	v.lt. rain
WAVES:	calm	ripple
AIR TEMPERATURE:	cool	cool
WIND DIRECTION:		

OBSERVATIONS MADE BY: Robert Langley

OTHER COMMENTS

WATER LEVEL OF LAKE: normal
RECREATIONAL USAGE: fishing, camping, picknicing

LAKE MANAGEMENT: no date; CUSO4 herbicide
ADDITIONAL COMMENTS:

TABLE 4. FIELD OBSERVATIONS, LAKE OMAHA, GALLATIN COUNTY, ILLINOIS, 1981

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
11/10/8	WATER COLOR:	clear	clear	lt. green	CLOUD COVER:	clear	clear	WATER LEVEL OF LAKE: normal
	SEDIMENT:	moderate	moderate	moderate	PRECIPITATION:	v. lt. rain	v. lt. rain	RECREATIONAL USAGE: fishing, picknicing
	ALGAE:	slight	slight	slight	WAVES:	ripple	moderate	
	WEEDS AT SAMPLE SITE:	slight	slight	moderate	AIR TEMPERATURE:	cool	cool	LAKE MANAGEMENT: CUSO4
	WEEDS NEAR SHORE:	slight	slight	duckweed,	WIND DIRECTION:			
	OTHER SUBSTANCES:	algal col.	waterfowl	waterfowl	OBSERVATIONS MADE BY: Robert Langley			ADDITIONAL COMMENTS:
	ODOR:	no odor	no odor	no odor				

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

DATE	OBSERVATION	SITE 1	SITE 2	SITE 3	WEATHER AT LAKE	PRESENT	PRECEEDING 24 HOURS	OTHER COMMENTS
	WATER COLOR:				CLOUD COVER:			WATER LEVEL OF LAKE:
	SEDIMENT:				PRECIPITATION:			RECREATIONAL USAGE:
	ALGAE:				WAVES:			
	WEEDS AT SAMPLE SITE:				AIR TEMPERATURE:			
	WEEDS NEAR SHORE:				WIND DIRECTION:			LAKE MANAGEMENT:
	OTHER SUBSTANCES:				OBSERVATIONS MADE BY:			ADDITIONAL COMMENTS:
	ODOR:							

There were seasonal differences in the transparency of Omaha Lake. Lowest transparencies were generally recorded in midsummer, and were probably the result of algal blooms. Field observations of the water color and amount of algae indicate that the transparency of Omaha Lake was influenced primarily by the presence of algae. A green water color was observed, algal colonies were noted on several sampling dates, and copper sulfate was routinely applied for algal control. Aquatic weeds were noted as abundant, particularly at Site 3. This may reflect the shallow nature of the site and/or nutrient input in the vicinity.

Relationship to Lake Use

Secchi disc transparency may indicate the potential of the lake for exhibiting water quality and use impairment problems. It may also help a fisherman locate the most likely fish habitat.

Generally, from the surface to between two and five times the Secchi disc depth can be considered the euphotic (lighted) zone of the lake; in this region there is enough light to allow plants to survive and produce oxygen by photosynthesis. This is also the zone of greatest fish activity. Waters below the euphotic zone can be expected to have little or no dissolved oxygen during the summer if the lake is thermally stratified (has layers of water of different temperatures). During this stratification period, fish will probably be limited to the euphotic or aerobic (oxygenated) zone of the lake.

The lower limit of the euphotic zone of Omaha Lake (estimated at twice the Secchi depth) ranged from 9-13 feet at Site 1, 6-12 feet at Site 2, and 3-6 feet at Site 3. Since Site 1 on Omaha Lake is deep enough to thermally stratify and the euphotic zone was generally less than the total depth, low dissolved oxygen values would be expected in the bottom waters.

In the absence of dissolved oxygen, undesirable substances such as hydrogen sulfide, ammonia, methane, phosphorus, iron, and manganese are released from the sediments and accumulate in the bottom waters. These substances can contribute to serious taste and odor problems in drinking water if water supply is taken from near the lake bottom during summer stratification. When substances which have accumulated in the bottom waters are distributed throughout the lake during mixing periods, they can also trigger nuisance algal blooms, aquatic weed growth, taste and odor, and other water quality problems.

SUMMARY AND RECOMMENDATIONS

Summary

Omaha Lake, a small public water supply reservoir in southern Illinois, was sampled on 13 dates between May 1 and November 10, 1981 under the

Illinois EPA's Volunteer Lake Monitoring Program. Volunteer Bob Langley recorded Secchi disc transparency, total depth, and field observations at three sites and reported results to the Illinois EPA.

The average Secchi disc transparency of Omaha Lake (48.6 inches) ranked 26th of the 87 lakes monitored by volunteers in 1981 (rank 1 is clearest; 87 is least transparent). Although this average transparency was less than the four feet minimum recommended for swimming by the Department of Public Health, it was in the normal range for Illinois lakes and was compatible with most recreational uses.

Site 1 on Omaha Lake is deep enough to thermally stratify during the summer. Since the lower limit of its euphotic zone (estimated at twice the Secchi depth) is generally less than the total depth, low bottom water dissolved oxygen values, associated water quality problems, and limitation of fish habitat may be expected during summer stratification.

Omaha Lake is undergoing the process of eutrophication as evidenced by transparency readings and field observations of algae, weed, and sediment problems. Protection from further degradation is critical. If nutrient and sediment input were controlled, lake quality would probably improve; failure to control inputs will probably result in continued rapid eutrophication. Lake managers should identify sources of nutrient and sediment input and take steps to control them before the lake becomes degraded.

Recommendations

Developing a management plan for a lake requires a comprehensive assessment of the lake and watershed and is beyond the scope of this project. However, some suggestions regarding lake management are presented below for consideration; their applicability to this lake would require further study. Alternative options not presented here may also apply.

Lake managers should work with the Soil and Water Conservation District and the Soil Conservation Service to develop a procedure to identify and quantify non-point pollution source areas. This procedure should allow for the targeting of resources and programs to correct the identified problems.

Installation of Resource Management Systems in source areas of the watershed may reduce nutrient and sediment transport to the lake. Stabilization of the lake shoreline by riprap or some other means may also reduce sediment input. Nutrient contributions from septic tanks, fertilization of lawns, and waterfowl should also be investigated and minimized.

In-lake management may also warrant consideration. Drawing oxygenated water from the upper strata for water supply use may help alleviate taste and odor problems. Aeration-destratification to prevent dissolved oxygen depletion may promote a shift in algal populations to species other than the problem causing blue-greens, alleviate taste and odor problems, and improve fishing. Harvesting of aquatic weeds might also be considered.

Continued monitoring is recommended for Omaha Lake. Consistent data gathered over a period of years is necessary to more fully document water quality trends, identify problems, and evaluate lake/watershed management strategies.

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DS:jab/sp3903C

GLOSSARY*

acre-foot - the volume of water required to cover one acre to a depth of one foot and equal to 0.3258 million gallons; a unit of storage capacity obtained by multiplying surface area (in acres) by average depth (in feet).

aeration-destratifcation - the addition of air to the water through mechanical means to increase the dissolved oxygen content of the bottom waters of lakes by eliminating thermal stratification and homogenizing the entire water column.

aerobic - conditions characterized by the presence of oxygen.

algae - one-celled or colonial photosynthetic plants (usually microscopic), found suspended in water or attached to damp rocks or other substrates.

algal bloom - a large number of planktonic algae, which often turns the water green and may produce objectionable scums and odors; a condition in which algae cloud the water noticeably.

ambient - existing condition or level at the time and place.

ammonia - a colorless, gaseous, alkaline compound which is a decompositional end product of nitrogen-containing organic matter; its importance in fresh water is associated with its toxicity to aquatic organisms and its use as a nutrient for aquatic plant growth.

anaerobic - conditions characterized by the absence of oxygen.

anoxic - without oxygen.

aquatic - growing or living in water; pertaining to water.

aquatic weeds - larger plants easily visible to the naked eye which are submergent, floating or emergent in the water.

artificial - man-made; constructed.

average depth - mean depth of a lake, calculated by dividing the volume (storage capacity) by the surface area.

backwater (or river backwater) - water impoundment located along the side of a stream or river which may flood periodically or have a direct connection to the stream at all times.

blue-green algae - a group of one celled or colonial plants of the phylum Cyanophyta, which live in water or damp places and reflect a blue to dark green tint; most often responsible for nuisance algal blooms with scum and odors.

borrow pit - a water impoundment formed by removal of earth for fill construction in the making of roads, dikes, bridges and levees

bottomland lake - natural water impoundment located in a river floodplain

circulation period - mixing period for a lake; period of time in which the entire lake volume is not thermally stratified and is totally mixed by wind action.

condition - the overall quality of the lake for supporting general use

detritus - finely divided organic and inorganic setteable material suspended in the water

diatoms - a group of one-celled or colonial algae living in water or damp places which are characterized by the presence of yellow-green or brown pigments and cell walls which contain silica and are composed of two halves (valves), one overlapping the other like the top and bottom of a pill box

drainage area - watershed; the land surface surrounding the lake which contributes water via surface runoff to the the lake

ecology - the study of the relationship of organisms to their environment

emergent - a rooted aquatic plant with parts normally extending above the water surface

epilimnion - upper, relatively warm, circulating zone of water in a thermally stratified lake

euphotic zone - region of a lake where light penetration is sufficient to maintain photosynthesis; its lower limit is generally two to five times the Secchi disc transparency.

eutrophic - waters which are rich in plant nutrients and capable of supporting high biological productivity; USEPA defines a eutrophic lake as one that exhibits any of the following characteristics: biomass accumulations of primary producers (algal blooms and excessive aquatic weeds); rapid organic or inorganic sedimentation and shallowing; or seasonal dissolved oxygen dificiencies in the bottom waters and subsequent shift in species composition of aquatic fauna to forms that can tolerate lower concentrations of oxygen.

eutrophication - lake aging trhough nutrient enrichment and sedimentation.

fertile - waters rich in plant nutrients.

glacial lake - body of standing water formed by glacial action.

green algae - a group of one-celled or colonial plants of the phylum Chlorophyta, which live in water or damp areas and reflect a greenish tint.

hydrogen sulfide - a gaseous compound produced under anaerobic conditions which has a rotten egg smell.

hypolimnion - lower, relatively cold, noncirculating zone in a thermally stratified lake.

impairment - that which damages or negatively impacts the present or potential use of a body of water.

impoundment - a body of standing water constructed by artificial means or formed by nature.

in-lake treatment or control techniques - methods to limit the availability of pollutants already in the lake or to accelerate their outflow; and various physical, chemical and biological approaches for managing the consequences of degradation and exhancing the usability of the lake without controlling the source of the degradation.

iron - an essential micronutrient, which is considered objectionable in water supplies because it can cause taste and odor problems and stain laundry.

lake - a body of standing water 6.0 acres or more in surface area (as defined by the Illinois Department of Conservation).

lake code - an eight-digit combination of letters and numbers used to identify a lake in the computer.

limnologist - aquatic ecologist; one who studies the physical, chemical, and biological aspects of lakes.

limnology - the study of the ecology of inland lakes.

littoral - shoreward region of a body of water.

macrophyte - large plant of macroscopic size (easily visible to the naked eye).

management - non-structural measures designed to enhance the quality and usability of a lake.

manganese - an essential micronutrient, which is considered objectionable at high concentrations because it can cause taste and odor problems.

maximum (max) - highest (largest) value observed in a data set.

maximum depth - depth of deepest point in a lake.

mean - a statistical term for average, calculated by totalling the values and dividing by the number of observations.

mean depth - the volume of a lake divided by its surface area; average depth.

mesotrophic - waters intermediate in character between oligotrophic and eutrophic; moderately well supplied with plant nutrients and capable of supporting moderate biological productivity.

minimum (min) - smallest (lowest) value observed in a data set.

mixing period - circulation period of a lake; period of time in which the lake is not thermally stratified and is totally mixed by wind action.

nitrogen - an element which is an essential plant nutrient and is one of the principal elemental constituents of proteins.

nonpoint pollution - pollution from diffuse sources (e.g., agriculture, forestry operations, mining, construction) for which a specific point of discharge cannot be readily identified.

nutrient - any chemical element, ion or compound that is required by an organism for the continuation of growth, reproduction and other life processes; nitrogen and phosphorus are usually growth limiting factors for aquatic plants.

oligotrophic - waters with low concentrations of plant nutrients and hence capable of supporting little biological productivity.

organizational impoundment - body of standing water owned, leased or maintained by an organization of six or more members (as defined by the Illinois Department of Conservation).

phosphorus - an element which is an essential plant nutrient and plays a vital role in the energy transfer during cell metabolism.

photosynthesis - the process by which green plants use the sun's energy to convert dioxide and water into chemical energy (carbohydrates, fats, and proteins).

phytoplankton - microscopic plants (algae) that drift passively in open water regions of lakes and rivers.

plankton - the community of microscopic plants and animals that drift passively in open water regions of lakes and rivers.

point source pollution - pollution eminating from a discharge point such as a pipe which can be specifically identified (e.g., sewage treatment plants, manufacturing plants).

pollution - any substance which makes another unclean or impure.

pond - small body of standing water less than 6.0 acres in surface area (as defined by the Illinois Department of Conservation).

potable - of quality for drinking.

private impoundment - body of standing water privately owned or leased with no fee charged for use (as defined by the Illinois Department of Conservation).

production - total amount of living matter produced in a lake per unit time.

productivity - rate at which organic material (and energy) is produced and transferred through organisms in an ecosystem; standing crop of organisms that can be supported.

protection - pollution abatement or control; measures to prevent pollution from entering a lake, including methods to stop the pollution at its source or to treat it before it reaches the lake.

public access - publicly owned contiguous land or easements providing any member of the public the same or equivalent opportunity to enjoy priviledges and benefits of the lake as any other member of the public or as any resident around the lake.

public impoundment - body of standing water owned and maintained by a governmental agency (excluding the Illinois Department of Conservation) that have public access.

public water supply - used as a municipal water supply for domestic needs.

Resource Management Systems - best management practices for the control and abatement of nonpoint pollution; a combination of agricultural practices which reduce soil erosion and/or increase water retention.

restoration - structural measures designed to return a lake to its original condition (e.g., dredging to original depth).

reservoir - a watershed impoundment artificially constructed by damming of a stream.

resuspend - cause to be suspended in the water.

river basin - drainage area for a large river.

seasonal - over a period of time (seasonal).

Secchi disc - an eight-inch diameter weighted metal plate painted black and white in alternating quadrants which is lowered into the water on a calibrated line to measure the transparency or clarity of the water.

Secchi disc depth - the depth into the water to which a black and white circular disc can be seen when viewed from the surface; a measure of water transparency or its ability to allow vertical light penetration.

sediment - the solid materials (particulate matter) transported by, suspended in or deposited from, water; includes fragmentary material that originates from weathering of rock, chemical and biochemical precipitants and decomposed organic material such as humus.

sediment-related turbidity - muddiness; cloudiness or opaqueness of the water caused by suspended sediment.

sedimentation - deposition of organic and/or inorganic particulate matter.

sedimentation surveys - measurement of the amount of sediment deposited in a water body.

segments - a subwatershed within a large river basin.

spatial - differences over an area.

standard deviation (Std. Dev.) - a statistical term to describe the variability of the data around the mean (average); if the magnitude of the standard deviation is "small" relative to the mean, then most of the values are close to the mean in magnitude and the data has little variability (is relative uniform); if the standard deviation is large in magnitude relative to the mean, then the data is more variable.

state impoundment - a body of standing water owned or leased and maintained by the Illinois Department of Conservation.

storage capacity - volume of water an impoundment can hold; often expressed in acre-feet, million gallons, and cubic meters.

submergent - an aquatic plant that lives and grows entirely below the surface of the water.

succession - in ecology, the progressive change of plant and animal life in an area.

suspended sediment - the sediment that at any given time is maintained in suspension by current or as a colloid.

suspended solids - particulate material that at any given time is maintained in suspension by current or as a colloid; total suspended solids are all suspended particular material, volatile and non-volatile, organic and inorganic; volatile suspended solids is that suspended particulate material, generally organic in nature, which undergoes combustion at a temperature of 600°C.

suspension - a heterogenous mixture in which the particles of one substance are kept dispersed by agitation.

thermal stratification - the layering of the water in a lake due to different densities as a function of temperature; the layers are the epilimnion (upper), metalimnion or thermocline (middle), and the hypolimnion (lower).

thermocline - metalimnion; the middle layer of water in a thermally stratified lake in which temperature decreases rapidly with increasing depth.

transparency - ability to allow light penetration and be seen through; clarity.

trophic state - the degree of eutrophication of a lake; the rate of primary biological production it is capable of supporting.

turbid - cloudy, opaque, murky, dirty-looking; containing suspensoids (organic or inorganic) which interfere with light penetration.

turbidity - amount of scattering of light caused by material suspended in the water.

use impairment - that which damages or negatively impacts the present or potential use of a body of water.

water quality - the suitability of the water for supporting various uses.

water retention time - water residence time; period of time a mass of water remains in an impoundment.

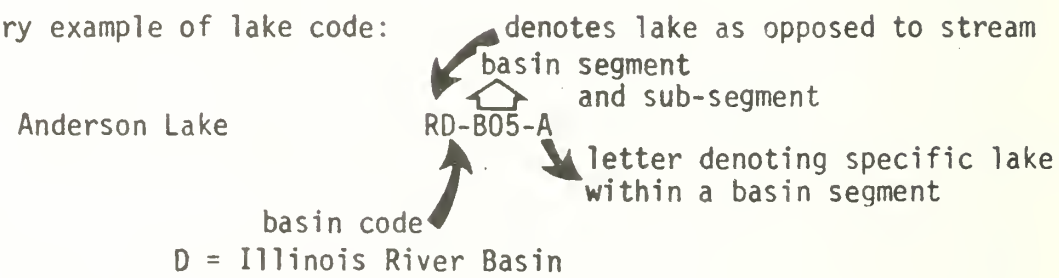
watershed - drainage area; the land surface surrounding the lake which contributes water, via surface runoff, to the lake; the total or contributing watershed area is the total draining to the lake, including the lake surface area; the immediate or net watershed is the portion of the total watershed (free of lakes or sloughs) from which direct, unimpeded surficial runoff drains to the lake.

zooplankton - animal portion of the community of suspended or floating organisms which drift passively with the water currents.

ABBREVIATIONS AND SYMBOLS

av - average
brn - brown
brnsh-grn - brownish-green
grn-brn - green-brown
grnsh-brn - greenish-brown
lt - light
max - maximum value
min - minimum value
mod - moderately
std. dev. - standard deviation
v - very

Explanatory example of lake code:



*Definitions of items in sense used in text

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